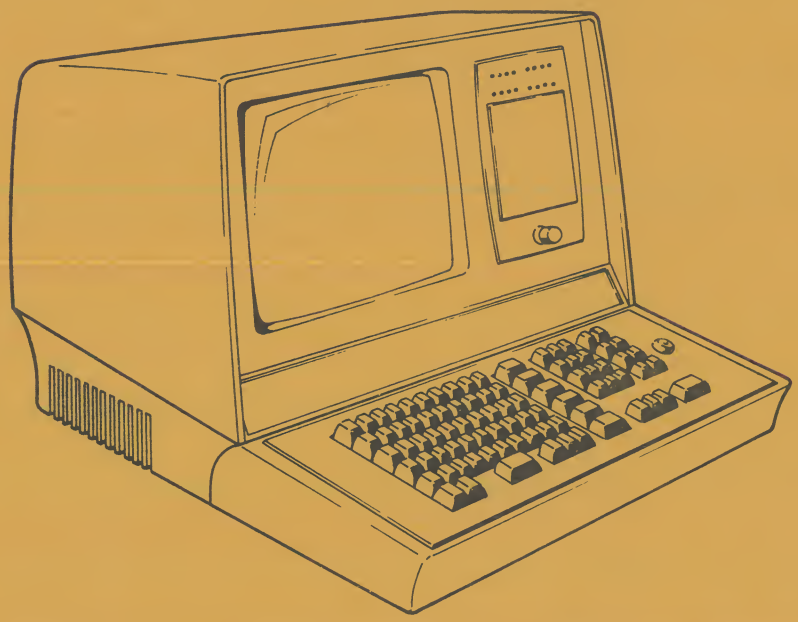
62953000

CONTROL DATA CORPORATION

CDC® DISPLAY TERMINAL

CC617-A/B



HARDWARE MAINTENANCE MANUAL

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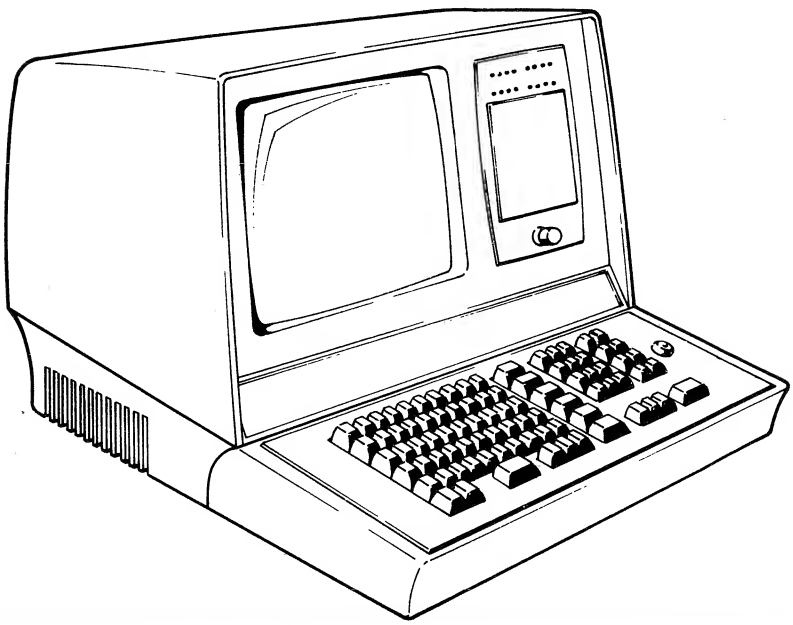

HARDWARE MAINTENANCE MANUAL

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REVISION RECORD

New features, as well as changes, deletions, and additions to information in this manual are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

REVISION	DESCRIPTION
01	Preliminary release.
02-15-76	
A	Final release. Includes changes per ECOs CD11277, 11402, and 11528.
04-01-76	This printing obsoletes all previous editions.
B	Revised and reprinted. Incorporates the CC617-B Display Terminal into
(12-09-76)	manual, causing most sections to be repaginated. Also incorporated are
	ECOs 11470, 11563, 11617, 11619, 11620, 11623, 11687, 11715, 11780A,
	11858, and FCO 11617. This printing obsoletes all previous editions.
C	Revised to include changes per ECOs 11642, 11773, 11897, 12001, 12115,
(07-12-77)	12010, and 12190. Affects pages v, vi, vii, viii, xv, xviii, xix, 3-11,
	3-17, 3-27, 4-27, 6-2, 6A-1 through 6A-6, 6A-13, 6A-14, 6A-17, 6A-21
	through 6A-51, 6B-1, 6B-2, 7-2, 7-3, 7-6 through 7-14, 7-18 through
	7-23, and comment sheet. Added page 6A-52.
D	Incorporates ECOs 12424, 12510, 12554, and 12648. Facilitates tracking of
(03-23-78)	keyboard by Engineering Services; reduces manufacturing costs of 5CYD card;
	and provides flexibility in the use of terminal cable assembly at different
	locations. Affects pages: v, vii, 1-3, 5-17, 5-19/5-20, 5-33, 5-35, 7-2
	through 7-14, 7-18 through 7-21, and comment sheet.

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Publication No.
62953000

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or use Comment Sheet in the back of this manual.

MANUAL TO EQUIPMENT LEVEL CORRELATION

This manual reflects the equipment configurations listed below.

EXPLANATION: Locate the equipment type and series number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

EQUIPMENT TYPE	SERIES	WITH FCO'S	COMMENTS
CC617-A	01	11617	
CC617-A	02	—	Series incremented by ECO 11619
CC617-A	03	—	Series incremented by ECOs 11687 and 11780
CC617-A	04	—	Series incremented by ECO 11858
CC617-A	05	—	Series incremented by ECO 11642
CC617-A	06	11897	Series incremented by ECO 11980
CC617-A	07	12115	Series incremented by ECO 12115
CC617-A	08	12424	Series incremented by ECO 12424
CC617-A	09		
XA175-A	01	11528	
XA175-A	02		

01987-2

MANUAL TO EQUIPMENT LEVEL CORRELATION (CONTD)

EQUIPMENT TYPE	SERIES	WITH FCO'S	COMMENTS
CC617-B	01	—	Series incremented by ECO 11858
CC617-B	02	—	Series incremented by ECO 11642
CC617-B	03	—	Series incremented by ECO 11980
CC617-B	04	12115	Series incremented by ECO 12115
CC617-B	05		

01987-3

PREFACE

This manual contains information to aid in the on-site maintenance of CONTROL DATA® CC617-A/B Display Terminal. The CC617-A Display Terminal, also known as QSE 18330, is part of a remote terminal subsystem configured for use by Ticketron. The CC617-A is an entity, in that it consists of a terminal controller with a fixed firmware program, a cathode-ray tube display, a power supply, and an operator keyboard. The CC617-B Display Terminal offers versatility in its application. For the CC617-B to function as a display terminal, it must be mated with a program memory module containing a firmware program, and an operator keyboard. These aspects of the display terminal are tailored to the application in which the CC617-B is to be used and are considered to be separate equipment. For these reasons, reference in this manual to the overall operating characteristics of the CC617-B are limited in nature. The only specific reference of this type, is to the Ticketron application of the CC617-B in areas where the subject matter pertaining to the exclusively Ticketron-used CC617-A happens to be the same as that of the Ticketron application of CC617-B.

The portion of this manual that is of primary importance during on-site repair is section 6, Maintenance. This section contains diagnostic decision logic tables to aid in isolating a fault, and associated corrective procedures. Generally a modular removal and replacement approach is employed in these procedures which dictates that once a fault is isolated to a module, that module is replaced with a new one. The defective module normally then is sent to a repair center for corrective action.

The corrective procedures also provide information on various component level replacements that may be performed on site. This maintenance approach requires that the site maintain spare modules and certain miscellaneous components to facilitate on-site repair. The suggested on-site spare parts list is contained at the end of section 7, Parts Data.

If the need arises for more detailed information on a basic display terminal module (such as that required for repair center repair work), refer to the applicable hardware maintenance manual. The following list defines their titles and publication numbers.

Title	Publication Number
STIC Module	62961100
+5-volt Regulator	62960700
Processor Module	62960000
Async I/F-2 Module	62960300
Display/Keyboard I/F Module	62969300
Power Supply	62969500
Video Display Module	62961800
Maintenance Panel	62960500
RAM Memory Module (applicable to CC617-A only)	62960100
ROM Memory Module (applicable to CC617-A only)	62960200
RAM/ROM Memory Module (applicable to CC617-B only)	62984900
Keyboard (applicable to CC617-A or Ticketron application of CC617-B only)	62969700

These manuals may be ordered from :

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Additionally, in the case of CC617-B, a manual supporting the on-site maintenance of the keyboard used in the application is initially shipped with the equipment. The same is true if an internal modem module is included in the application. Although not listed, additional copies of these manuals also may be ordered from the preceding address.

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Section Page

CRT DISPLAY/KEYBOARD

FIGURES

TABLES

Due to their differences in configuration makeup, the first portion of this section contains a separate overall description for the two models of the display terminal. Following each overall description is a series of paragraphs which describes the major assemblies/modules of that model. At the rear of the section is a listing of data pertaining to their physical, electrical, and environmental characteristics.

CC617-A DISPLAY TERMINAL

The CC617-A Display Terminal, which is also known as QSE 18330, is part of a remote terminal subsystem configured for use by Ticketron. The CC617-A is the main controlling unit of this subsystem and is in itself, an entity, in that it consists of a terminal controller, a cathode-ray tube (crt) display, a power supply, and an operator keyboard. These elements of the subsystem are the only ones that are specifically covered by this manual. The other elements of the subsystem include the units briefly described below. A block diagram of the subsystem is shown in figure 1-1.

- Ticket printer controller — contains power, control logic, and interface electronics for the ticket printer, an optional matrix printer, and a modem.
- Ticket printer — contains the basic printing mechanism for printing tickets.
- Optional matrix printer — contains the basic printing mechanism for printing administrative data.

The subsystem, of which CC617-A is a part, interacts with the higher-level Ticketron processing system via common carrier facilities (telephone lines), and the terminal operator via keyboard input. Ticket information that is displayed on the crt can be printed by the ticket printer under control of the operator. The subsystem also allows for the addition of a matrix printer for printing administrative data. Communications between the subsystem and the higher-level processor are asynchronous and normally are at a data transfer rate of 1200 bits per second (1200 baud rate). The data transfer rate of the CC617-A is from 150 to 9600 bits per second, with the rate being switch-selected to match that used in the communications. The maximum cable lengths of the interface connections between CC617-A and the other units of the subsystem are defined in figure 1-1. As noted in the figure, the modem associated with the subsystem must comply to the requirements of EIA standard RS-232-C. A listing of the interface signals and their pin assignments to the interface connectors of the display terminal are contained in appendix A.

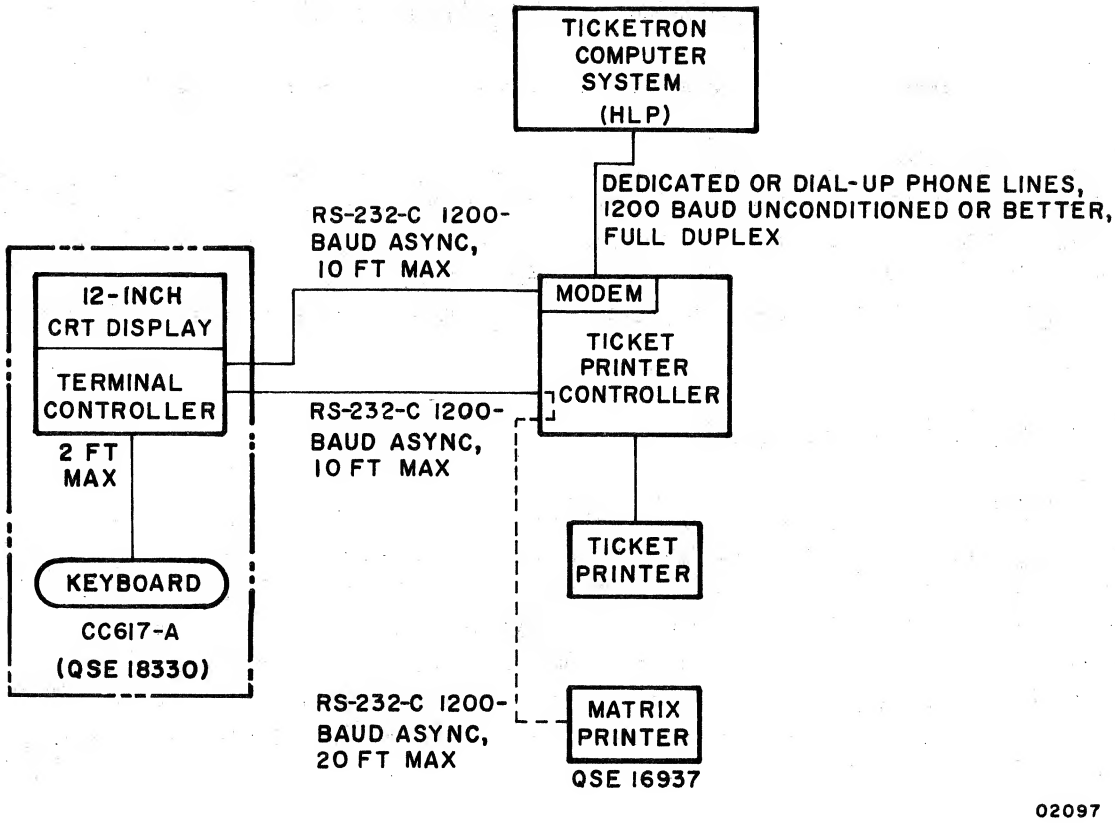
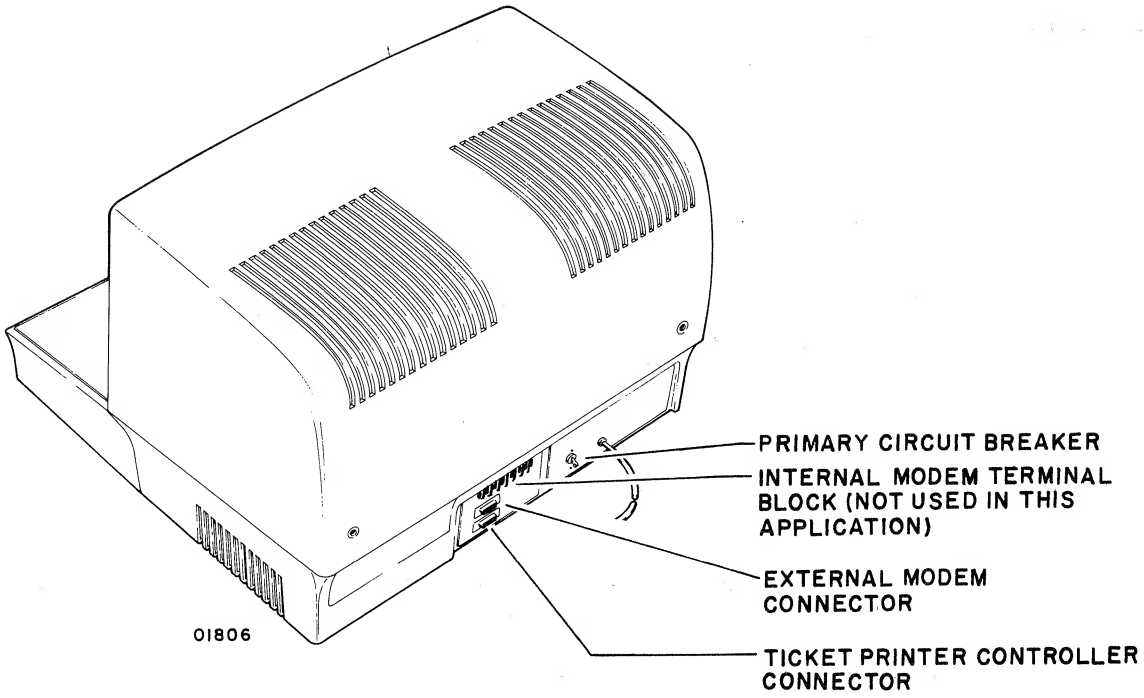


Figure 1-1. Ticketron Terminal Subsystem Employing CC617-A

The outward appearance of CC617-A is shown in figure 1-2. Its operator keyboard, which is specifically designed for entering ticket selling data, contains 86 keys with a keylock switch for operational security. Initially, the keylock switch must be unlocked with a key and set to either the ON or MGT (management) position before data can be entered and displayed on the crt, via the keyboard. To the right of the crt screen is a maintenance panel containing 16 indicators that show the operating and communication status of the terminal, along with the INTENSITY control for the crt. Also contained on the maintenance panel are 10 control switches that are hidden from the operator behind a removable cover. These switches are only for use during checkout and maintenance of the terminal. Located at the rear of the display terminal (refer to figure 1-2), is its primary circuit breaker, a 9-foot ac power cord, and connectors for making the interface connections to the subsystem modem and ticket printer controller. The primary circuit breaker provides primary (ac input power) and secondary (power supply) power overload protection for the terminal and also serves as its on/off switch. Amperage rating of the primary circuit breaker is 3.5 amperes.



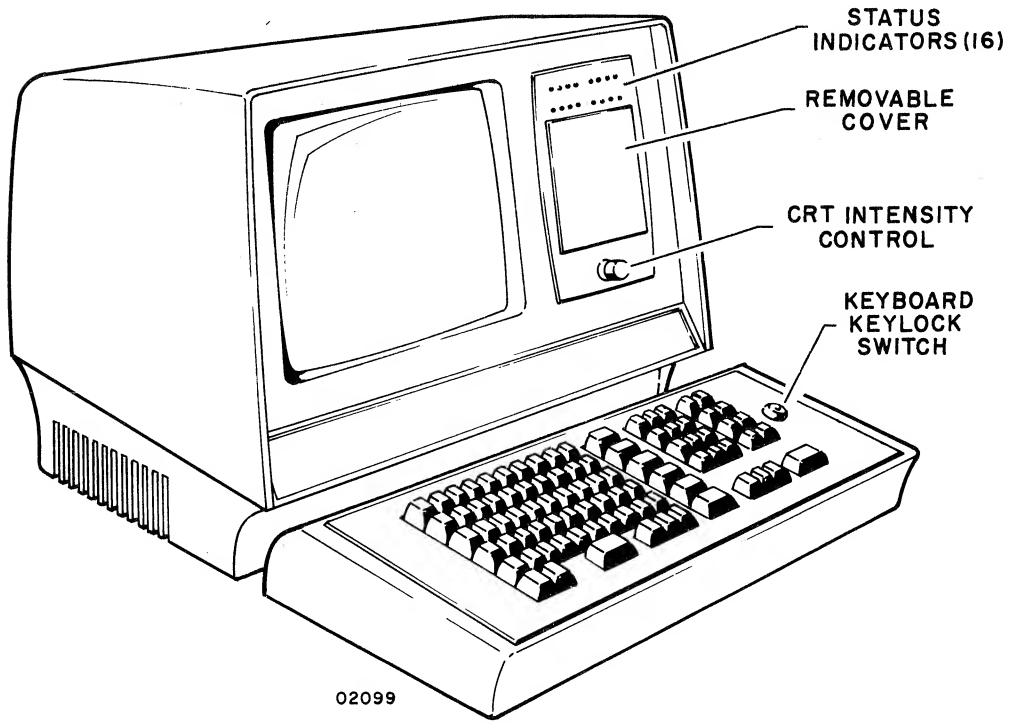


Figure 1-2. CC617-A Display Terminal

The following paragraphs describe the major assemblies/modules of CC617-A. Except for the keyboard these modules are located within the cabinet of CC617-A, as shown in figure 1-3. Major features inherent to these modules include the following:

- A 12-inch (diagonal measurement) crt with video drive circuitry that has a program-generated blinking underline cursor and can show programmable blink, blank, dim, and inverse video fields.
- Symbol generation circuitry that can generate 96 standard ASCII characters and 16 special characters. The dot matrix patterns and associated codes for these characters are contained in appendix B.
- Display refresh memory (random-access memory).
- Memory for applications program storage (random-access memory).
- A fixed firmware program stored in a read-only memory that causes the display terminal to perform an initial self-test, a checksum routine, and an autoload of the applications program.
- Control circuitry for interfacing the display terminal to a modem and to a ticket printer controller.
- Program-generated selection of display format — 40 characters by 6 lines, 40 characters by 12 lines, 80 characters by 12 lines, or 80 characters by 24 lines.

CRT MONITOR

The basic function of the crt monitor is to display alphanumeric video information on the crt screen. It consists of a crt and associated video drive circuits mounted on a printed-circuit (PC) board. This unit interfaces with the display/keyboard logic board which furnishes the video and sweep signals. The vertical sweep frequency is 60 Hz; horizontal sweep frequency is 15.8 kHz. The crt screen is approximately 8 inches high and 10-1/2 inches wide (12 inches diagonal), and uses a nominal raster area of 8 inches wide by 5-1/4 inches high.

POWER SUPPLY

The power supply module is a solid-state supply that uses a transformer output to produce unregulated +20-V dc, -20-V dc, and 20-V ac. Regulated voltages of -5-V dc, +12-V dc, and -12-V dc are also provided. Major physical features of the power supply are a transformer assembly, capacitor board, regulated board, and a bridge rectifier.

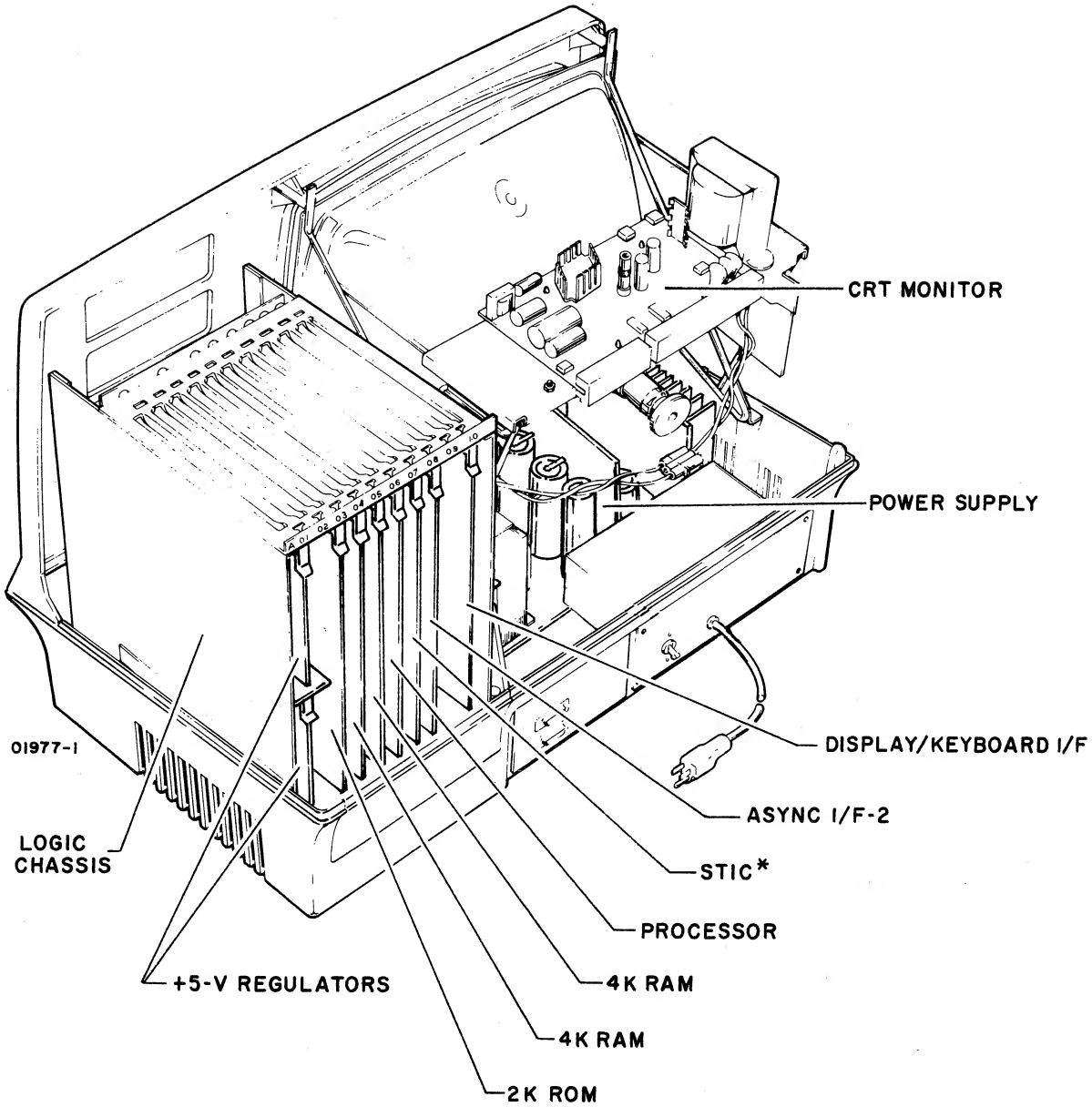


Figure 1-3. Internal Modules of CC617-A

LOGIC CHASSIS

The logic chassis is designed to house eight standard 60-pak PC modules and two voltage regulator modules. It contains a PC backpanel for interconnecting the modules. A total of seven PC logic modules and two 5-volt dc regulators are used in CC617-A. These are described in the following paragraphs.

---

* Special Timing and Interrupt Control

+5-V dc Regulator Modules

Two regulator modules are used and provide regulated +5-V dc power to the various logic modules contained in the logic chassis. They derive their output from the unregulated +20-V dc produced by the power supply module. Each 5-volt regulator module can provide up to 10 amperes current.

2K Read-Only Memory Module (ROM)

This module contains the firmware program sequences which allow the display terminal to perform an initial self-test (quicklook), RAM checksum, and autoload from the higher-level processor (HLP). These program sequences require 2K bytes of ROM memory.

4K Random-Access Memory Modules (RAM)

Two RAM modules are used and contain the temporary type memory necessary for controlware programs, tables, device buffers, and display refresh of the crt. A total of 8K of RAM is provided for these purposes.

Processor Module

This module is an 8-bit-per-byte microprocessor that interfaces with and controls the functions of all the other logic modules in the logic chassis. It governs the operation of the display terminal by retrieving and executing program instructions stored in the ROM and RAM modules. Included in its responsibilities is the control of access to the RAM for the entry or retrieval of data. Impending communications from other logic modules to the processor module are handled through the use of interrupts.

Async I/F-2 Module

This module allows the processor to communicate with the higher-level processor via an RS-232-C compatible asynchronous communications link. This module has two ports; each port has the following capabilities:

- RS-232-C signal levels
- 8-bit character frame with one start bit and one stop bit

- Half-duplex line control
- Switch-selectable baud rate (150, 300, 600, 1200, 1800, 2400, 4800, and 9600 baud) plus a variable frequency select

This module also transfers parallel data bidirectionally between the processor module and the serial data communication port, generates and checks parity, generates interrupts, and provides status to the processor module.

Special Timing and Interrupt Control (STIC) Module

This module provides the following functions:

- Monitoring of interrupts for the processor module
- Basic timing for the async I/F-2 module
- Monitoring of RAM modules for parity error condition
- Maintenance panel interface
- Sound alarm input
- Switch-selection of the site address of the display terminal
- Master clear/autoload control

Display/Keyboard Interface Module

This module provides a dual interface with the crt display monitor and the keyboard. The display portion of this module obtains data directly from RAM and generates video signals to the crt display. The keyboard portion of the module interfaces the keyboard to the Data bus. Data is received from the keyboard in 8-bit parallel format with a Data Ready signal. The Data Ready causes an interrupt to the processor module to allow the keyboard input to be entered into memory.

Sound Alarm

A sound alarm is located on the bottom of the logic chassis. The alarm is under software (programmable) control via the STIC module. When activated, the alarm generates a frequency of 2900 ±500 Hz at a sound level of 68 to 80 decibels.

KEYBOARD

The keyboard is a detachable, tabletop data input device containing 86 nonlocking, momentary-contact, magnetic-reed-type key switches. When a key is pressed, it generates an 8-bit code (unique to the key position) and a Data Ready signal. This information is sent to the display/keyboard interface module via a 2-foot cable connecting the keyboard to the keyboard connector of the display terminal. This connector is located at the bottom right front of the display terminal.

The keyboard assembly also contains a three-position keylock switch to indicate OFF, ON, and MGT (management) modes. The switch position cannot be changed without the insertion of a key. Status bits are provided to the keyboard interface logic indicating the position of this switch. The ON and MGT positions control power application to the ticket printer controller.

CC617-B DISPLAY TERMINAL

The module configuration of the CC617-B Display Terminal allows for versatility in its application. Its configuration consists of a terminal controller that contains no memory and consequently no fixed firmware program, along with a crt display and a power supply. It differs from the CC617-A, in that it must be mated with an operator keyboard and a program memory module to function as a display terminal. The program memory module contains both ROM and RAM type memory, with the ROM having a fixed firmware program stored in it. The firmware program dictates the functional characteristics of the host display terminal. For the sake of versatility, the keyboard and the program memory modules are considered separate equipment. For these reasons, reference to them or to the characteristics that they introduce to the display terminal are made in a limited manner in this manual. The only specific reference to the Ticketron application of CC617-B is in areas where the subject matter pertaining to the exclusively-Ticketron-used CC617-A happens to be the same as that of the Ticketron application of CC617-B. In the areas where this condition exists, the fact is noted.

A block diagram of CC617-B is shown in figure 1-4. The CC617-B has provisions for interfacing with a printer (in the case of the Ticketron application, a ticket printer controller), and can either interface with an external modem or host an optional modem module in its logic chassis. The cable lengths for these interface connections and that of the keyboard module used in the application, are as follows:

- Display terminal to printer — 10 feet maximum
- Display terminal to external modem — 50 feet maximum
- Display terminal to keyboard module — 2.5 feet maximum

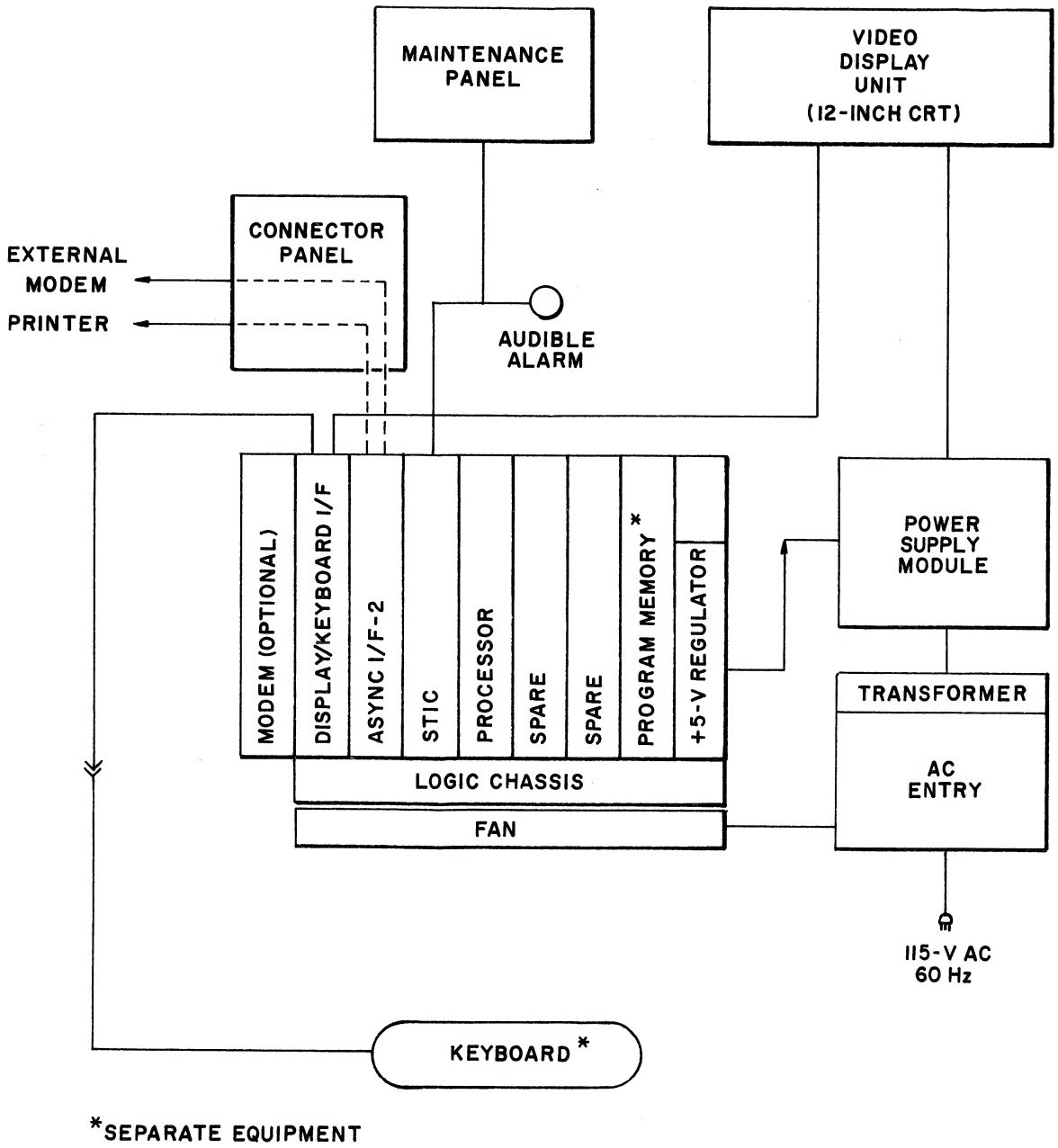


Figure 1-4. Module Block Diagram of CC617-B Display Terminal

The CC617-B interacts with a higher-level processor via common carrier facilities (telephone lines), and a terminal operator via keyboard input. Data received from either of these sources can be displayed on its crt and depending upon the application, may also be printed on an associated printer. Its communications with the higher-level processor are asynchronous and may be in either half-duplex or full-duplex mode. The modem associated with the display terminal must comply to the requirements of EIA standard RS-232-C, and depending upon system requirements, may be either the half-duplex, 2-wire or full-duplex, 4-wire variety.

The printer that may be associated with the display terminal must also be an asynchronous communication device with interface characteristics that meet RS-232-C requirements. In addition, depending upon the application, the printer may have provisions for handling a Keylock In/Keylock Out signal connection to control the application of power to it for security purposes. When used in an application such as Ticketron, the electrical condition of the Keylock In and Keylock Out signal lines from the display terminal are dependent upon what position a keylock switch is in on the keyboard module. When the keylock switch is in the ON or MGT (management) position, these signal lines are electrically connected and a voltage of between +18 to +23 V dc flows through them. When the keylock switch is in the OFF position, these signal lines are electrically disconnected and only the Keylock In signal line has voltage on it. A listing of the interface signals and their pin assignments to the interface connectors of the display terminal are contained in appendix A.

The outward appearance of CC617-B is shown in figure 1-5. The keyboard module used in the application connects to the display terminal via the interface connector located at the bottom right front of the terminal. (In the Ticketron application, the keyboard module is the same as that described in the CC617-A portion of this section.) To the right of the crt screen is a maintenance panel containing 16 indicators that show the operating and communication status of the terminal, along with the INTENSITY control for the crt. Also contained on the maintenance panel are 10 control switches that are hidden from the operator behind a removable cover. These switches are for use only during checkout and maintenance of the terminal.

Located at the rear of the display terminal, refer to figure 1-5, is the primary circuit breaker, 9-foot ac power cord, and connectors for making the interface connections to an associated printer and an external modem. If the optional modem module is employed in the application in lieu of an external modem, the communications telephone cable is connected to the terminal block located above the modem connector. The primary circuit breaker provides primary (ac input power) and secondary (power supply) power overload protection for the terminal and also serves as its on/off switch. Amperage rating of the primary circuit breaker is 3.5 amperes.

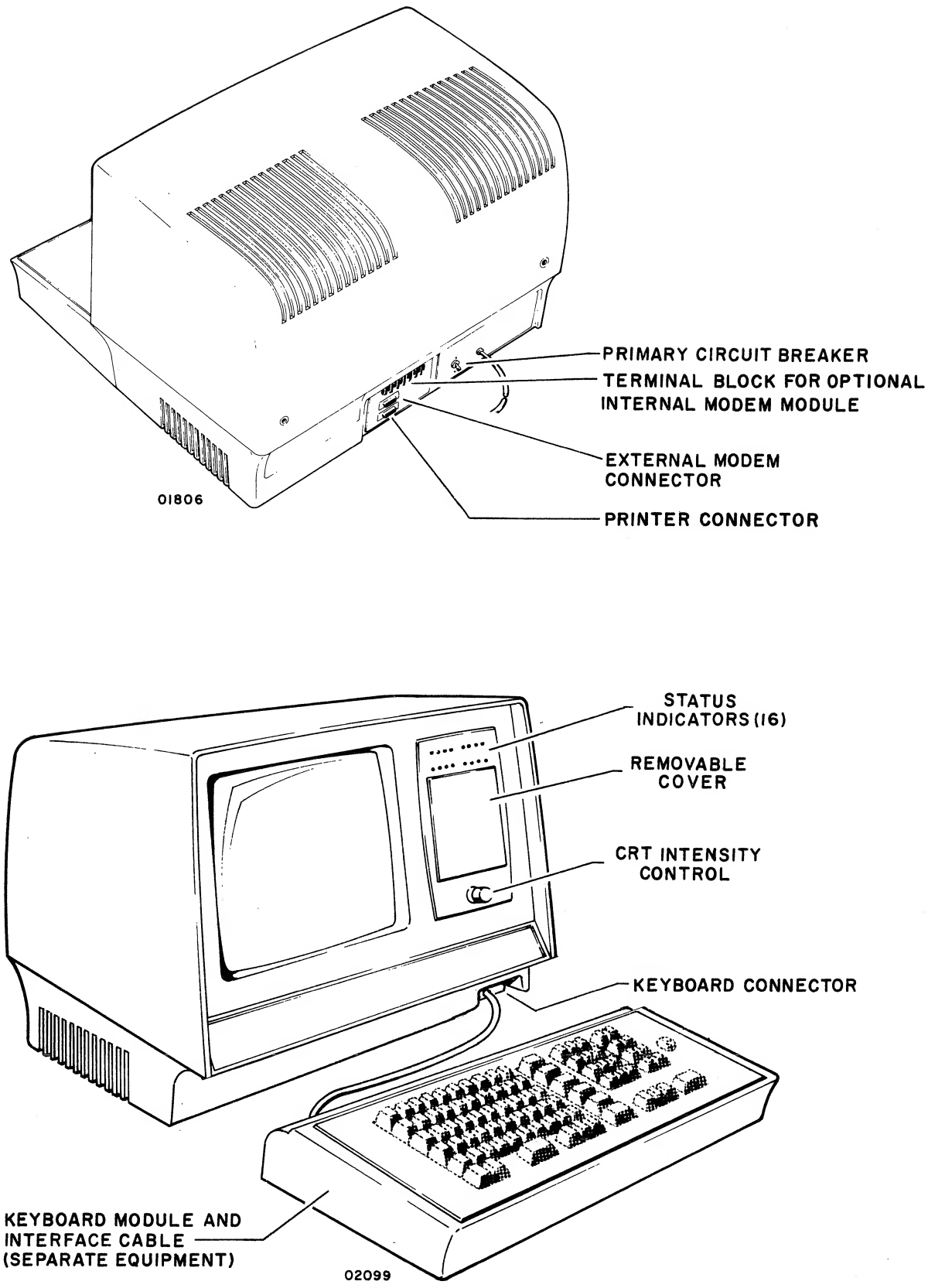


Figure 1-5. CC617-B Display Terminal

The internal layout of CC617-B is shown in figure 1-6. Locations of the major modules are pointed out in the figure along with the location of the program memory module associated with the application, and the location reserved for the optional modem module. Versions of the program memory module designed for use with CC617-B consist of a single PC board that contains both ROM and RAM memory along with circuitry that interfaces the memory with the display terminal shared bus. The two card connectors of card location 03 in the logic chassis, where the program memory module is inserted, provide all the necessary power and signal connections for this interface. Pin assignments of the interface connections pertaining to the program memory module are shown in the interconnection diagrams contained in section 5, Diagrams.

Stored within the ROM, of the program memory module, is a fixed firmware program that is application oriented and dictates the functional characteristics of the display terminal. The RAM provides the temporary memory necessary for storage of display refresh data and for storage of the applications program that is loaded into the RAM from a higher-level processor during display terminal initialization. Only one program memory module can be used in a display terminal. The storage capacity of the ROM and RAM are as follows:

- ROM — up to 6144 8-bit words made up of 1024 8-bit word increments, with the actual capacity dependent on the requirements of the firmware program used in the application. (In the Ticketron application, 2048 8-bit words of storage are provided for this purpose.)

- RAM — 8192 by 9 bits, with the 9 bits representing 8 bits of data accompanied with an internally generated and internally checked parity bit (8K of 8-bit word storage).

There are three versions of an optional single PC board modem module that can be used in the application of CC617-B. As shown in figure 1-6, the location in the logic chassis reserved for the insertion of a modem module is card location 09. The two card connectors in this location provide all the interface connections that are required between the modem module and the communications telephone line (fastened to the terminal block at the rear of the display terminal) and between the modem module and modem interface and power circuitry of the display terminal. There are provisions for making individual pin connections between the modem module version part number 51912400 and a data coupler with a handset such as the Bell System CBS Data Coupler, via the top card connector. All of the interface connections and pin assignments pertaining to the modem module are shown in the interconnection diagrams contained in section 5.

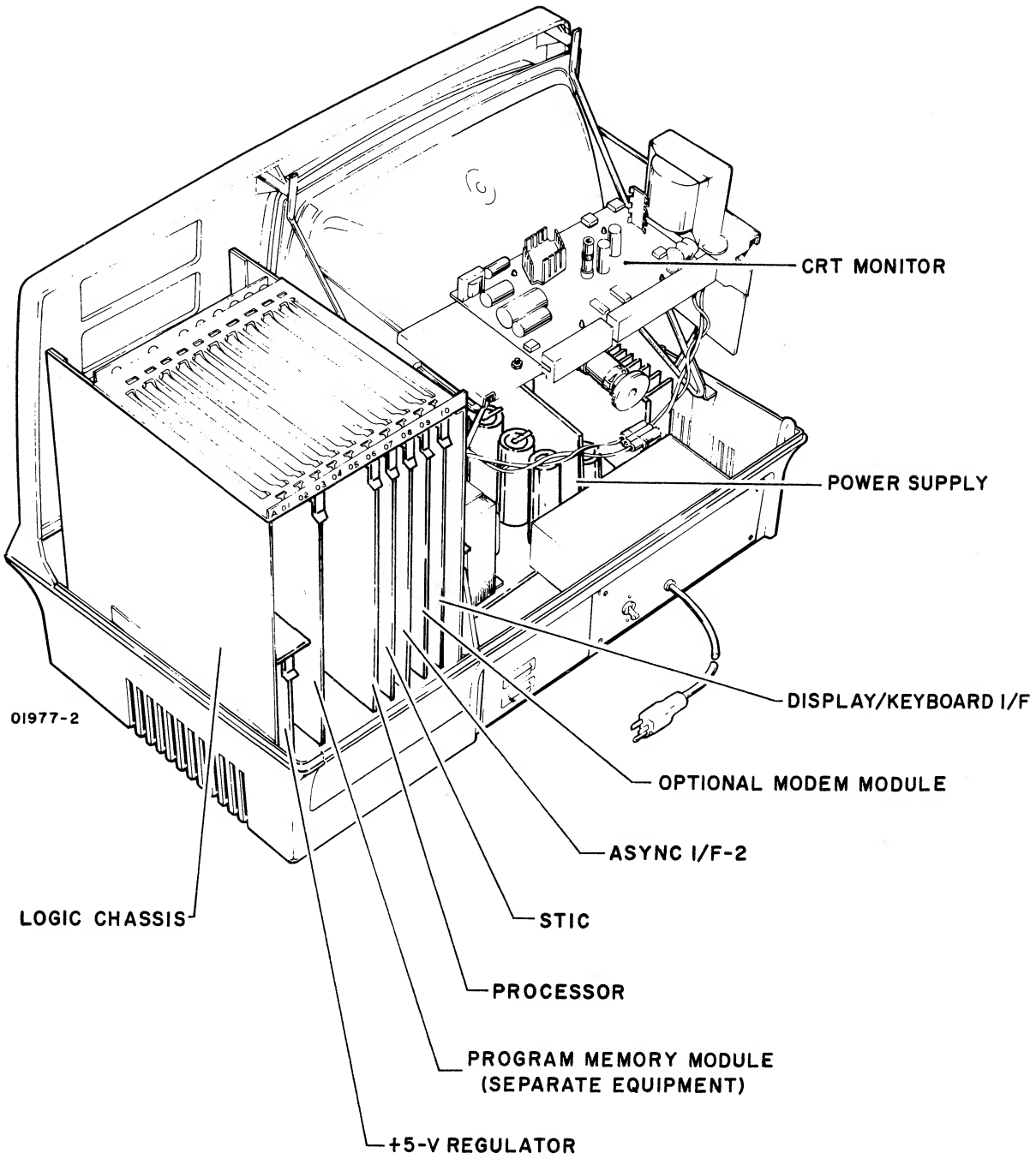


Figure 1-6. Internal Layout of CC617-B

All three versions of the modem module have similarities in that all can operate in either point-to-point or multipoint communication arrangements and each meet the requirements of EIA standard RS-232-C for asynchronous modems. Also, each version employs the phase-coherent frequency shift keying type of modulation/demodulation. Other particulars concerning the three versions of the module are as follows:

- CDC part number 51912400 — has a receive/transmit data transfer rate of from 0 to 1200 bits per second on switched-network communication lines or up to 1800 bits per second on leased communication lines. It can be configurated in either full-duplex, 4-wire or half-duplex, 2-wire fashion and can service a data coupler with a handset. The data coupler and handset may be part of either a Bell System CDT or CBS Data Access Arrangement.
- CDC part number 51912402 — has a receive/transmit data transfer rate of from 0 to 1200 bits per second on leased communication lines configured in full-duplex, 4-wire fashion.
- CDC part number 51912403 — has the same capabilities as that given for part number 51912402. The only difference between the two versions is that part number 51912403 can provide its own regulation of power voltage, which in this case is not used.

The major modules within the configuration of CC617-B are described in the text which follows. Many of the features inherent to these modules add to the application versatility of CC617-B in that they are either switch-selectable or firmware/applications program-selectable. Features in this category include the following:

- Switch selectability of communications baud or data transfer rate (150, 300, 600, 1200, 1800, 2400, 4800, or 9600 plus a variable frequency select).
- Firmware program selectability of data character lengths in communications (5, 6, 7, or 8 data bits).
- Firmware program selectability of the number of stop bits that follow a data character in communications (1 or 2 stop bits, or a possible 1.5 stop bits if a 5-bit data character length is being used).
- Firmware program selectability of the type of parity that is used in communications (odd, even, or none).
- Firmware/applications program selectability of the display format that is used by the display terminal (40 characters by 6 lines, 40 characters by 12 lines, 80 characters by 12 lines, or 80 characters by 24 lines).
- Firmware/applications program generation of a blinking underline cursor, with no restriction as to how many can be displayed simultaneously.

Other major features inherent to these modules include the following:

- 12-inch (diagonal measurement) crt with video drive circuitry that can show programmable blink, blank, dim, and inverse video fields.
- Symbol generation circuitry that can generate 96 standard ASCII characters and 16 special characters. The dot matrix patterns and associated codes for these characters are contained in appendix B.
- Control circuitry for interfacing the display terminal to a modem and a printer device with the rate of communications on each interface not necessarily being identical. (This would require that the switch-selected baud rate previously mentioned, which exists on each interface, would be set accordingly.)

CRT MONITOR

The basic function of the crt monitor is to display alphanumeric video information on the crt screen. It consists of a crt and associated video drive circuits mounted on a printed-circuit (PC) board. This unit interfaces with the display/keyboard logic board which furnishes the video and sweep signals. The vertical sweep frequency is 60 Hz; horizontal sweep frequency is 15.8 kHz. The crt screen is approximately 8 inches high and 10-1/2 inches wide (12 inches diagonal), and uses a nominal raster area of 8 inches wide by 5-1/4 inches high.

POWER SUPPLY MODULE

The power supply module is a solid-state supply that uses a transformer output to produce unregulated +20-V dc, -20-V dc and 20-V ac. Regulated voltages of -5-V dc, +12-V dc, and -12-V dc are also provided. Major physical features of the power supply are a transformer assembly, capacitor board, regulator board, and a bridge rectifier.

RED — +5 V
YELLOW — +19 V
GREEN — −19 V

LOGIC CHASSIS

The logic chassis is designed to house eight standard 60-pak PC modules and two voltage regulator modules. It contains a PC backpanel for interconnecting the modules. In its use in CC617-B, a total of six PC modules and one voltage regulator module may be housed. This includes the program memory module used in the application, the optional modem module, and the four PC modules that are part of the CC617-B configuration. A brief description of the latter four PC modules and of the regulator module are contained in the paragraphs that follow.

Rom - QuickLook

+5-Volt dc Regulator Module

This module provides regulated +5-V dc power to the other modules housed in the logic chassis. It derives its output from the unregulated +20-V dc produced by the power supply module. The maximum output current provided is 10 amperes.

Processor Module

This module is an 8-bit-per-byte microprocessor that interfaces with, and controls the functions of all the other PC modules housed in the logic chassis. It governs the operation of the display terminal by retrieving and executing program instructions stored in the ROM and RAM of the applications program memory module. Included in its responsibilities is the control of access to the RAM for the entry or retrieval of data. Impending communications from other PC modules to the processor module are handled through the use of interrupts.

Async I/F-2 Module

As its name implies, this module contains two separate asynchronous communication interfaces or ports. One of its ports is connected to the external or internal modem associated with the display terminal, and the other is connected to the interface connector of the display terminal intended for use by an associated printer. Through these ports it performs all the receive and transmit functions of the display terminal which are under control of the processor module. The switch selectability feature of the baud or data transfer rate of communications is provided by two sets of rocker switches that are located on this module, one set of switches for each port. The functions performed by this module include the following:

- Converts serial data received from the modem or printer to parallel data acceptable for handling by the processor module during receive operations and vice versa during transmit operations.
- Checks received data characters for the type of parity (odd, even, or none) that the firmware program of the application dictates, and adds the appropriate parity bit to data characters that are to be transmitted.
- Checks received serial data for the framing and length that the firmware program of the application dictates, and accordingly generates the framing of data characters to be transmitted. The framing of a data character consists of: a start bit, the data character (5, 6, 7, or 8 data bits in length), the parity bit (if any), and 1 or 2 stop bits (or a possible 1.5 stop bits if a 5-bit data character length is being used).
- Generates interrupts to the processor module when a firmware program preselected interrupt condition occurs.

Special Timing and Interrupt Control (STIC) Module

This module provides the following functions:

- Monitoring of interrupts for the processor module
- Basic timing for the async I/F-2 module
- Monitoring of program memory module for RAM parity errors
- Maintenance panel interface
- Sound alarm input
- Switch-selection of the site address of the display terminal
- Master clear/autoload control for performing display terminal initialization

Display/Keyboard Interface Module

This module provides a dual interface with the crt display monitor and the keyboard module used in the application. The display portion of this module obtains data directly from the RAM of the program memory module and generates video signals to the crt display. The keyboard portion of the module interfaces the keyboard module to the processor module. Data is received from the keyboard in 8-bit parallel form accompanied with a Data Ready signal. The Data Ready causes an interrupt to the processor module to allow the keyboard input to be entered into the RAM of the program memory module.

Sound Alarm

A sound alarm is located on the bottom of the logic chassis. The alarm is under software (programmable) control via the STIC module. When activated, the alarm generates a frequency of 2900 ±500 Hz at a sound level of 68 to 80 decibels.

PHYSICAL, ELECTRICAL, AND ENVIRONMENTAL CHARACTERISTICS

Following are the physical, electrical, and environmental characteristics for each model of the display terminal.

PHYSICAL CHARACTERISTICS

The dimensions and weight of the display terminal are:

- CC617-A (minus its keyboard)
- CC617-B (in its entirety)

  Height: 15.7 in
  Width: 21.4 in
  Depth: 13.85 in
  Weight: 60 lb

- Keyboard (applicable to CC617-A only)

  Height: 4.2 in
  Width: 21.65 in
  Depth: 9.25 in
  Weight: 7.5 lb

ELECTRICAL CHARACTERISTICS

The electrical power requirements for both models are:

Voltage: 115-V ac ±10%
Phase: Single
Frequency: 59 - 60.6 Hz, 60 Hz nominal
Current: 1.5 A, nominal

ENVIRONMENTAL CHARACTERISTICS

The environmental characteristics for both models are:

Operating Temperature: 50° to 95°F
Operating Maximum Temperature Change: 18°F per hour
Operating Maximum Altitude above Sea Level: 10 000 ft
Storage Temperature: -40° to 158°F
Storage Relative Humidity: 5 to 95% noncondensing
Storage Maximum Altitude above Sea Level: 10 000 ft

This section describes the basic keyboard functions, keyboard data codes, communication status indicators, and the display terminal initialization (firmware) program that applies to the Ticketron application of CC617-B and to the exclusively-Ticketron-used CC617-A. Due to the nearly unlimited variety of applications in which the CC617-B Display Terminal can be used, similar information pertaining to other applications is not provided. The only exception is the description of the status indicators on the display terminal maintenance panel which applies to other applications.

KEYBOARD MODULE (TICKETRON APPLICATION ONLY)

The keyboard module, figure 2-1, provides the means for data entry into the computerized transaction system. The function of the keylock switch and basic functions of the individual keys are listed in table 2-1. Specific software functions of these keys are controlled by Ticketron, and therefore are not described in this manual. The hexadecimal key codes assigned to each of the 86 keys on the keyboard and the keycap colors and legends are listed in table 2-2.

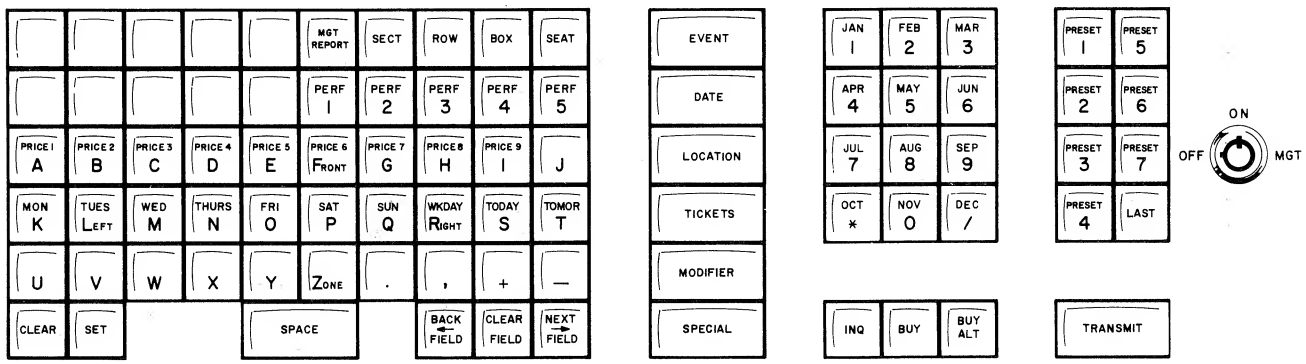


Figure 2-1. Keyboard Layout (Ticketron Application Only)

TABLE 2-1. KEYBOARD CONTROLS (TICKETRON APPLICATION ONLY)

NAME	TYPE	FUNCTION
OFF/ON/MGT	Three-Position Keylock Switch	Controls power application to the ticket printer controller and establishes the operating mode of the terminal.
OFF		When in OFF position, no power is supplied to the ticket printer electronics. Power to the display logic and memory remains on, keeping programs and stored data intact. Generates Status bits: $2^3 = 0$, $2^2 = 0$.
ON		When in ON position, terminal is in normal operating state. Power is supplied to all devices controlled by the keylock switch. Generates Status bits: $2^3 = 0$, $2^2 = 1$.
MGT		Software-controlled function. Generates Status bits: $2^3 = 1$, $2^2 = 1$.
Data Entry Keys	Pushbutton Keyswitches	Data entry keys are grouped into two clusters which permit operator input of alphabetic and numeric data.
Alphabetic		The alphabetic keys consist of A through Z, space, and symbols, + and - . Following depression of field key DATE, alphabetic keys K through T translate and enter as MON, TUES, WED, THURS, FRI, SAT, SUN, WKDAY, TODAY, and TOMOR (tomorrow), respectively.
Numeric		The numeric keys consist of 0 through 9 and symbols / and *. Following depression of field key DATE, the numeric keys 1 through 9, *, 0, and / translate and enter as months JAN through DEC respectively.
Field Keys	Pushbutton Keyswitches	The field keys include EVENT, DATE, LOCATION, TICKETS, MODIFIER, SECT (section), ROW, BOX, and SEAT. These keys are used to facilitate the desired ticket transaction.
Control Keys	Pushbutton Keyswitches	Control keys are CLEAR, SET, BACK FIELD, CLEAR FIELD, NEXT FIELD, PRESET 1 through PRESET 7, LAST, and TRANSMIT.

TABLE 2-1. KEYBOARD CONTROLS (TICKETRON APPLICATION ONLY) CONTD

NAME	TYPE	FUNCTION
CLEAR		Pressing CLEAR clears out the present transaction and resets the starting mask on the crt screen.
SET		Pressing SET permits the use of preset keys PRESET 1 through PRESET 7 and LAST to direct the storage of keyboard data.
BACK FIELD		Pressing BACK FIELD repositions the cursor to the beginning of the field. Data within the field is not modified.
CLEAR FIELD		Pressing CLEAR FIELD clears the data in the field at which cursor is positioned. The cursor is returned to the beginning of that field.
NEXT FIELD		Pressing NEXT FIELD positions the cursor to the beginning of the next field on the display screen.
Preset Keys PRESET 1 through PRESET 7 and LAST	Pushbutton Keyswitches	The preset keys, PRESET 1 through PRESET 7 and LAST, are used to direct the storage of transaction data.
TRANSMIT	Pushbutton Keyswitch	Pressing TRANSMIT sends all data previously entered on the current transaction to the central computer.
Self-Defined Field Keys	Pushbutton Keyswitches	The self-defined field keys are grouped into two clusters containing PERF 1 through PERF 5 performance keys and INQ (inquiry), BUY, and BUY ALT (buy alternate) instruction keys.
PERF 1 through PERF 5		These keys are used to select any one of up to five performances on the same date.
INQ BUY BUY ALT		The instruction keys instruct the computer to perform inquiry, buy, or buy alternate actions upon other data in the request.
SPECIAL	Pushbutton Keyswitch	The special function key (SPECIAL) provides for the entry of fields for special types of transactions not defined on the keyboard, but under program control.

TABLE 2-2. KEY CODES AND LEGENDS (TICKETRON APPLICATION ONLY)

CODE (HEX)	LEGEND	COLOR	CODE (HEX)	LEGEND	COLOR	CODE (HEX)	LEGEND	COLOR
01*		Black	29	PRICE 1 A	Gray	51	U	Gray
02*		Black	2A	PRICE 2 B	Gray	52	V	Gray
03*		Black	2B	PRICE 3 C	Gray	53	W	Gray
04*		Black	2C	PRICE 4 D	Gray	54	X	Gray
05*		Black	2D	PRICE 5 E	Gray	55	Y	Gray
06	MGT REPORT	Gray	2E	PRICE 6 FRONT	Gray	56	ZONE	Gray
07	SECT	Blue	2F	PRICE 7 G	Gray	57	.	Gray
08	ROW	Blue	30	PRICE 8 H	Gray	58	,	Gray
09	BOX	Blue	31	PRICE 9 I	Gray	59	+	Gray
0A	SEAT	Blue	32	J	Gray	5A	-	Gray
0B**			33**			5B**		
0C**			34**			5C**		
0D	EVENT	Blue	35	LOCATION	Blue	5D	MODIFIER	Blue
0E**			36**			5E**		
0F	JAN 1	Blue	37	JUL 7	Blue	5F**		
10	FEB 2	Blue	38	AUG 8	Blue	60**		
11	MAR 3	Blue	39	SEP 9	Blue	61**		
12**			3A**			62**		
13	PRESET 1	Light Blue	3B	PRESET 3	Light Blue	63**		
14	PRESET 5	Light Blue	3C	PRESET 7	Light Blue	64**		
15*		Black	3D	MON K	Gray	65	CLEAR	Gray
16*		Black	3E	TUES LEFT	Gray	66	SET	Gray
17*		Black	3F	WED M	Gray	67**		
18*		Black	40	THURS N	Gray	68**		
19*		Black	41	FRI O	Gray	69**		
1A	PERF 1	Blue	42	SAT P	Gray	6A	SPACE	Gray
1B	PERF 2	Blue	43	SUN Q	Gray	6B**		
1C	PERF 3	Blue	44	WKDAY RIGHT	Gray	6C	←BACK FIELD	Gray
1D	PERF 4	Blue	45	TODAY S	Gray	6D	CLEAR FIELD	Gray
1E	PERF 5	Blue	46	TOMOR T	Gray	6E	→NEXT FIELD	Gray
1F**			47**			6F**		
20**			48**			70**		
21	DATE	Blue	49	TICKETS	Blue	71	SPECIAL	Blue
22**			4A**			72**		
23	APR 4	Blue	4B	OCT *	Blue	73	INQ	Red
24	MAY 5	Blue	4C	NOV 0	Blue	74	BUY	Red
25	JUN 6	Blue	4D	DEC /	Blue	75	BUY ALT	Red
26**			4E**			76**		
27	PRESET 2	Light Blue	4F	PRESET 4	Light Blue	77**		
28	PRESET 6	Light Blue	50	LAST	Light Blue	78	TRANSMIT	Red

* Black keys are uninscribed and have no legends.

** These key codes are unassigned and unused.

MAINTENANCE PANEL STATUS INDICATORS

The terminal and communication status indicators located on the maintenance panel of the display are described in table 2-3. All are light-emitting diode (LED) indicators.

TABLE 2-3. STATUS INDICATORS

NAME	FUNCTION
ON RDY (Ready)	Indicates program execution has started.
ACTV (Active)	Indicates that the terminal has been polled at least once since the start of program execution.
XMT REQ (Transmit Request)	Indicates a transmit request when operator presses TRANSMIT key. Extinguishes immediately before the terminal sends its message to the central computer.
TRAN PROG (Transaction in Progress)	Indicates a transaction in progress immediately after terminal response to a poll. Stays on until terminal completes all of its output response and becomes ready to accept a new request from the keyboard.
COMM ERR (Communication Error)	Indicates a communication error.
CD (Carrier Detect)	Indicates that the modem is receiving a Carrier signal from the central computer.
RD (Receive Data)	Indicates that data signals are being received from the central computer.
MPE (Memory Parity Error)	Indicates detection of a memory (RAM) parity error. It can only be cleared by a power on or manual reset.
RTS (Request to Send)	Indicates that the terminal is about to transmit data.
CTS (Clear to Send)	Indicates that the modem is ready for data transmission.
TD (Transmit Data)	Indicates that the data signals are being transmitted to the central computer.

DISPLAY TERMINAL INITIALIZATION (TICKETRON APPLICATION ONLY)

Display terminal initialization is accomplished through use of a ROM resident firmware program that contains a quicklook diagnostic, a loader (autoload), and a checksum routine. These are described briefly in the following paragraphs. Refer to appendix C of this manual for a detailed description.

The normal sequence for terminal initialization is to apply power to the display terminal with maintenance panel switches 0 through 7 in the logical 0 position (left). It is assumed that the higher-level processor has available all pages of the applications to be loaded into the terminal's RAM memory. Then when power is applied, the quicklook diagnostic will automatically sequence through quicklook tests 001 through 005. These tests check the basic operation of the display terminal hardware before loading the applications program. Tests performed are:

- ROM checksum test (test 001)
- RAM memory test (test 002)
- CPU command test (test 003)
- Asynchronous communications channel test (test 004)
- CRT display test (test 005)

Upon the successful completion of these tests, the autoload program is automatically initiated to load the applications program. The applications program stored in the higher-level processor is divided into pages. The first page is a load page containing a page table that describes each program page available from the higher-level processor. The autoload program requests the load page and loads this page into page 1 of terminal memory. Then, using the load page as a table, the autoload program requests and loads all pages of program 1. When program 1 has been successfully loaded, the autoload jumps to the start of program 1 for execution.

During the quicklook-autoload sequence, the crt provides a visual indication of the tests and load operations being performed. A code is displayed in inverse video at the upper-left corner of the crt. This white block of data is termed a microdisplay. When executing a quicklook test, the microdisplay will contain a T followed by the test number. For example, T001 for quicklook test 1. During autoload the microdisplay will contain an L followed by the reference designation of the program page being loaded. For example, L001 for the loading of a program page having the reference designation of 001.

If a quicklook error occurs, or if the autoload cannot be loaded successfully, the sequence halts and the microdisplay will show an X following the test or reference designation number displayed. For example, T001X or L002X, etc.* Manual intervention is then required to reinitiate the quicklook-autoload sequence, such as reapplying terminal power or toggling the RESET switch. The EXECUTE switch can be used to perform a reload of a program page following an L---X error. Refer to procedure CRT1 contained in section 6, Maintenance, of this manual for additional corrective information.

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* An exception is quicklook test 003, in which no X is displayed following the T003. A program load of a nonexistent page will cause a display of P---X.

INSTALLATION AND CHECKOUT 3

This section describes the crating, uncrating, installation, and checkout procedures for the display terminal. For similar information on other equipments that may be contained in the terminal subsystem, refer to the applicable hardware maintenance manual for the equipment. Should any difficulty arise, refer to section 6, Maintenance, of this manual for troubleshooting and corrective maintenance procedures.

Before proceeding to the procedures in this section, make note of the precautions that follow.

MOS CIRCUIT HANDLING PRECAUTIONS

The display terminal contains a number of PC boards that have MOS (metal-oxide semiconductor) integrated circuits on them. The MOS circuits are susceptible to irreparable damage if they are exposed to excessive static electricity, and thus require special handling. To expedite this, the safest practice to develop is to adhere to the following precautions at all times when handling any of the PC boards.

- Never insert, install, remove, replace, or otherwise connect/disconnect any circuit(s) within the terminal subsystem with primary power applied to any of the cabinets and/or equipments within the subsystem. Power off for the cabinet being worked on is not sufficient. An interface adapter module, powered within another cabinet, may be supplying signals to the logic chassis of the cabinet in which you are installing/removing a MOS circuit. This may be sufficient to damage the MOS circuits upon initial contact with the powered circuit.

WARNING

When observing static grounding precautions, do not touch powered-on electrical equipment and chassis frame at the same time.

- Before touching, grasping, or handling any circuit, connector, cable, or logic chassis backpanel always touch hand(s) to an exposed portion of the associated chassis frame to equalize potentials (bleed off any possible static charge from your hands onto the ground-level chassis).

- Especially in dry ambient air, any movement may cause static electricity buildup due to friction. In the case of shuffling one's feet across a dry carpet, such damage may be quite high and may easily jump from a cable connector being held onto the pins being mated to. This could damage the MOS circuits within the equipment. Thus, the chassis frame must always be touched immediately before connecting any cable to it.
- When removing, replacing, or otherwise handling any assembly/module which contains MOS circuits, do not touch circuit paths or conductors if at all possible. Do not carry a MOS circuit assembly across a room while touching its circuits.
- When a module is out of its chassis, if it is to lay somewhere where it may be touched, if it is to be carried to some other location, or if it is to be shipped, the module should be wrapped in static protective material, such as aluminum foil.

CRATING

The required materials and crating procedures to be followed when preparing the display terminal for shipment are shown in figure 3-1. Use only approved materials to protect against shipping damage. To obtain proper materials, contact the nearest CDC representative or:

Control Data Corporation
Corporate Traffic
8100 34th Avenue South
Minneapolis, Minnesota 55440

If the need arises to ship one of the modules of the display terminal in for repair, use the same packing material and carton that held its replacement. As mentioned under MOS Circuit Handling Precautions, special care must be exercised when packing a module that contains MOS circuits.

UNCRATING

To uncrate the display terminal, refer to figure 3-1 and perform the following:

1) Open top of exterior container and lift cables secured in end frame slits of packaging material.
2) Lift top flaps of end frames and remove keyboard.
3) Remove the two "T" blocks interlocked in the end frames.
4) Remove display with end frames attached from the exterior container.
5) Remove the end frames and any remaining packaging material from the display.
6) Inspect the display and keyboard for any shipping damage.

MATERIALS REQUIRED	QTY	CDC PART NO.
END FRAME CUSHIONING	2	41035801
3" WHITE REINFORCED BOX SEALING TAPE	A/R	---------
EXTERIOR CONTAINER	1	41035802

NOTES:
1) INTERLOCK FOAM BASE LEGS WITH END FRAMES
2) PLACE END FRAMES WITH BASE LEGS ON DISPLAY
3) PLACE DISPLAY WITH END FRAMES INTO CONTAINER
4) INTERLOCK "T" BLOCKS WITH END FRAMES
5) LIFT TOP FLAPS ON END FRAMES AND INSTALL KEYBOARD WITH KEYS FACING DOWN
6) SECURE CABLES IN END FRAME SLITS AS SHOWN
7) CLOSE AND SEAL CONTAINER WITH 3" WHITE REINFORCED BOX SEALING TAPE

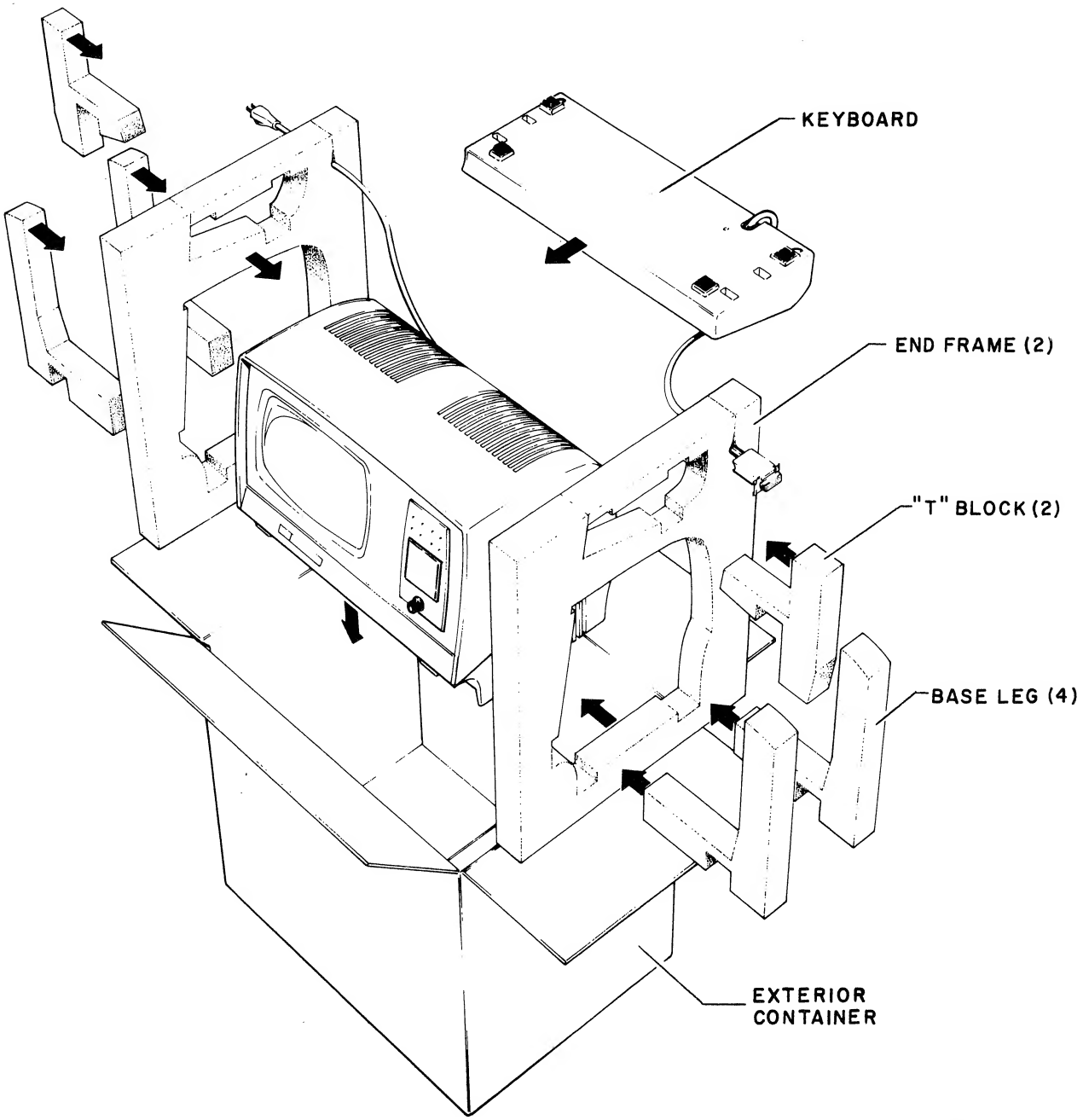

Figure 3-1. Display Terminal Packaging

INSTALLATION

The following paragraphs describe the installation instructions for the display terminal. All procedures referenced in the instructions are contained in section 6 of this manual. An index is provided at the end of section 6 which lists the page numbers for the various procedures.

1) Move the display terminal to the desired location and make sure there are no obstructions that will interfere with the air intake and exhaust vents of the display terminal cabinet.

CAUTION

Do not lift the unit by the cabinet hood.

2) Remove cabinet hood by unscrewing two mounting screws in rear of cabinet hood, see figure 3-2, and sliding hood back and up.

3) Check that all PC boards are in their proper chassis location and that they are seated securely. The card placement for the CC617-A is shown in figure 3-3, while the card placement for CC617-B is shown in figure 3-4.

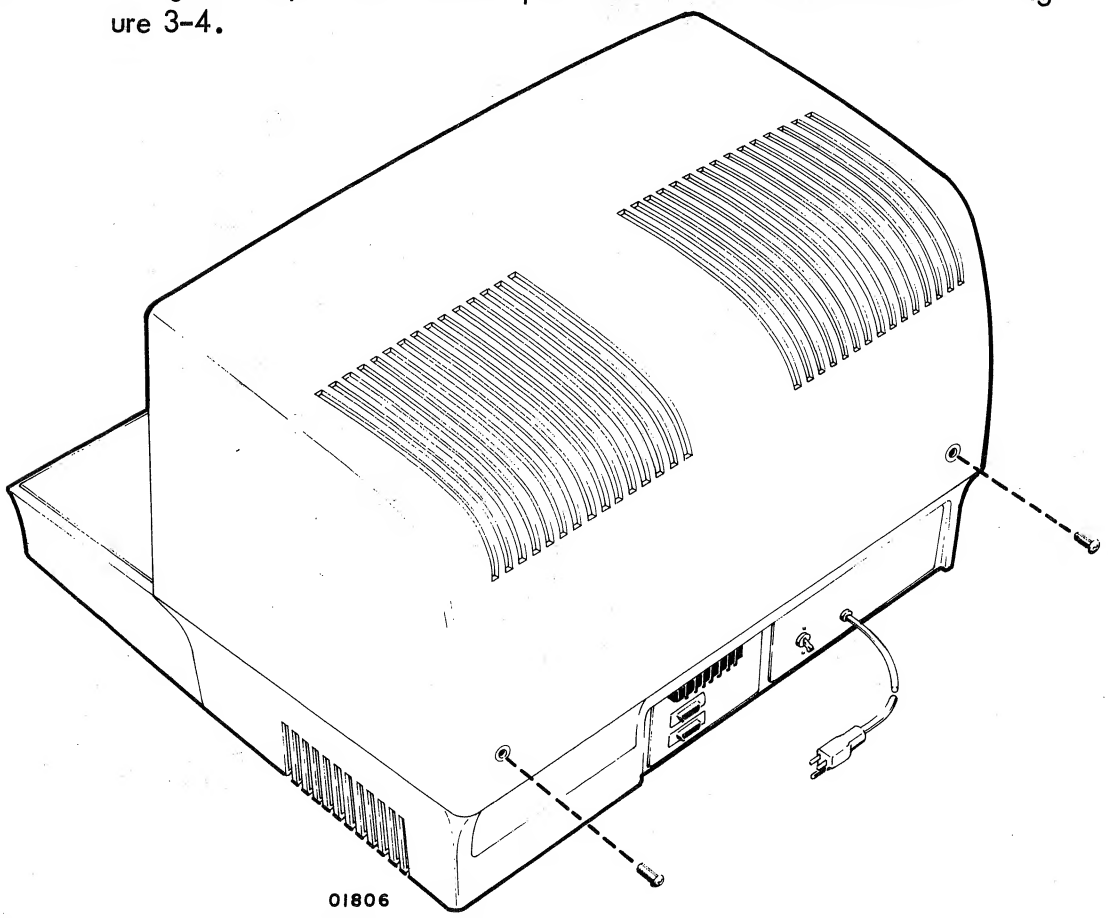

Figure 3-2. Cabinet Hood Removal

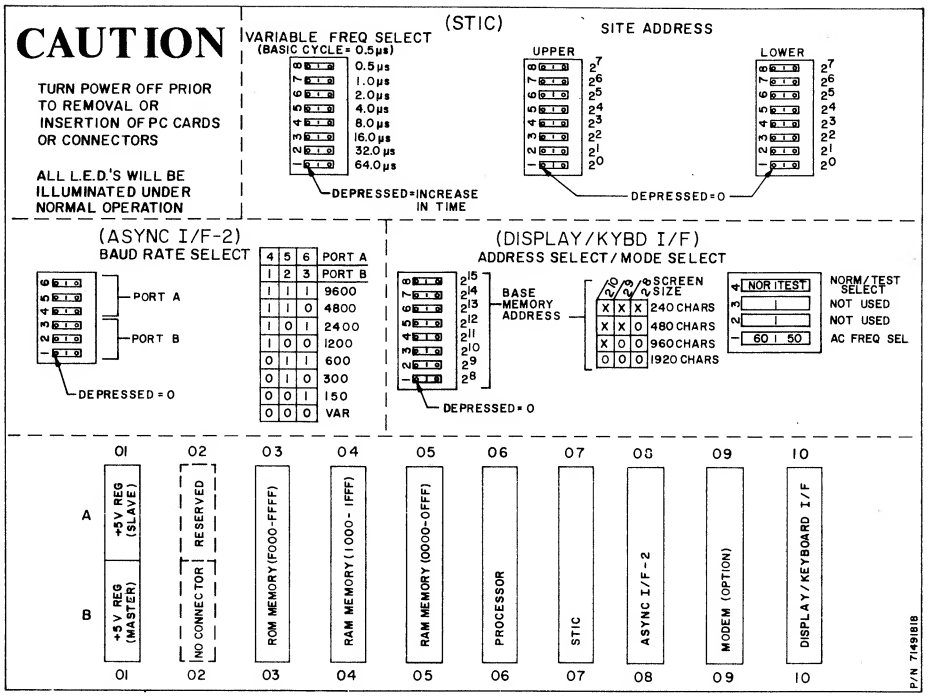

Figure 3-3. CC617-A Display Terminal Card Placement

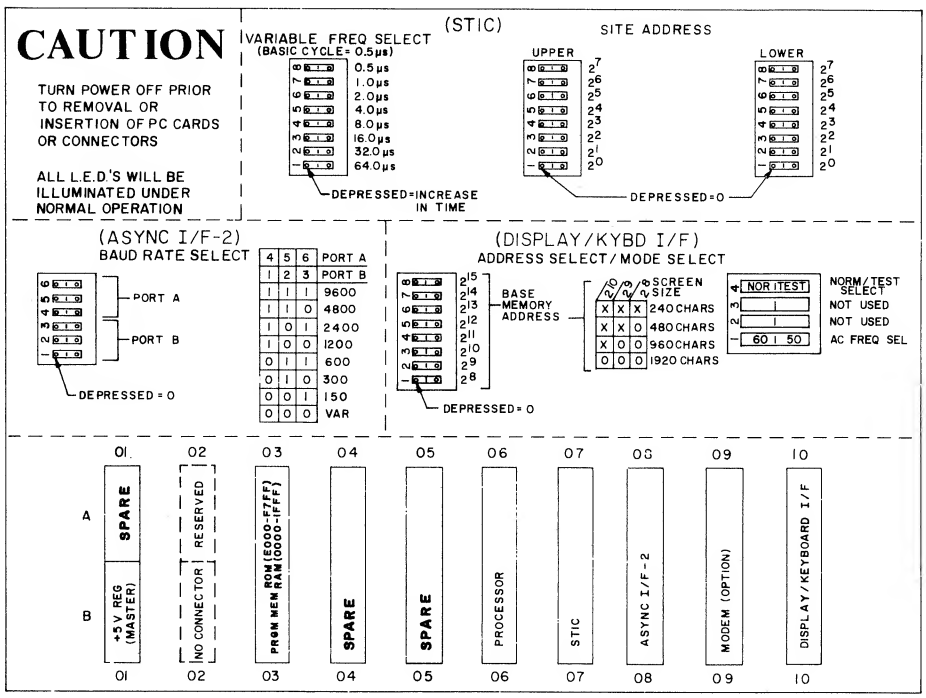

Figure 3-4. CC617-B Display Terminal Card Placement

4) Check that all internal cables are connected correctly and seated securely. Refer to figure 3-5.

5) Set the internal switches on the display terminal PC boards per the following. Refer to figure 3-3 or 3-4 for switch locations and arrangement. Additional information on switch settings is contained in the PC board descriptions in section 4, Theory of Operation, of this manual.

   a) STIC module — Chassis location 07. The top eight switches are used to establish a variable baud rate frequency input to the async I/F-2 module. Under most circumstances, communications take place at a rate that can be matched by one of the fixed baud rate switch selections (150, 300, 600, 1200, 2400, 4800, and 9600) available on the async I/F-2 module, thus making the position of these eight variable frequency switches meaningless. If the rate of communications cannot be matched by one of the fixed baud rate settings, refer to section 4 and determine the required setting of the variable frequency switches for your situation.

   Site address selection is established by the other 16 switches located on the STIC module. The middle group of switches on the board is for the upper 8 bits of the site address and the bottom group of switches is for the lower 8 bits of the address. The 2^0 bit for each group is the lowest switch position. Pressing a switch down nearest the board edge enables a 0 for that address bit. Obtain the required site address from the customer.

   b) Async I/F-2 module — Chassis location 08. The communication baud rate selection for the modem interface connections (port A) and the ticket printer controller or associated printer (port B) is established by six switches located on the async I/F-2 module. As shown in figure 3-3 or 3-4, the top three-switch segment of the group is for port A and the bottom three-switch segment is for port B. Pressing a switch down nearest the board edge places a 0 in that position of that segment. If the rate of communications for a port cannot be matched by one of the fixed baud rate switch selections, the switches of that segment must be set to the variable frequency selection (all pressed down nearest board edge) with the eight variable frequency switches of the STIC module set appropriately.

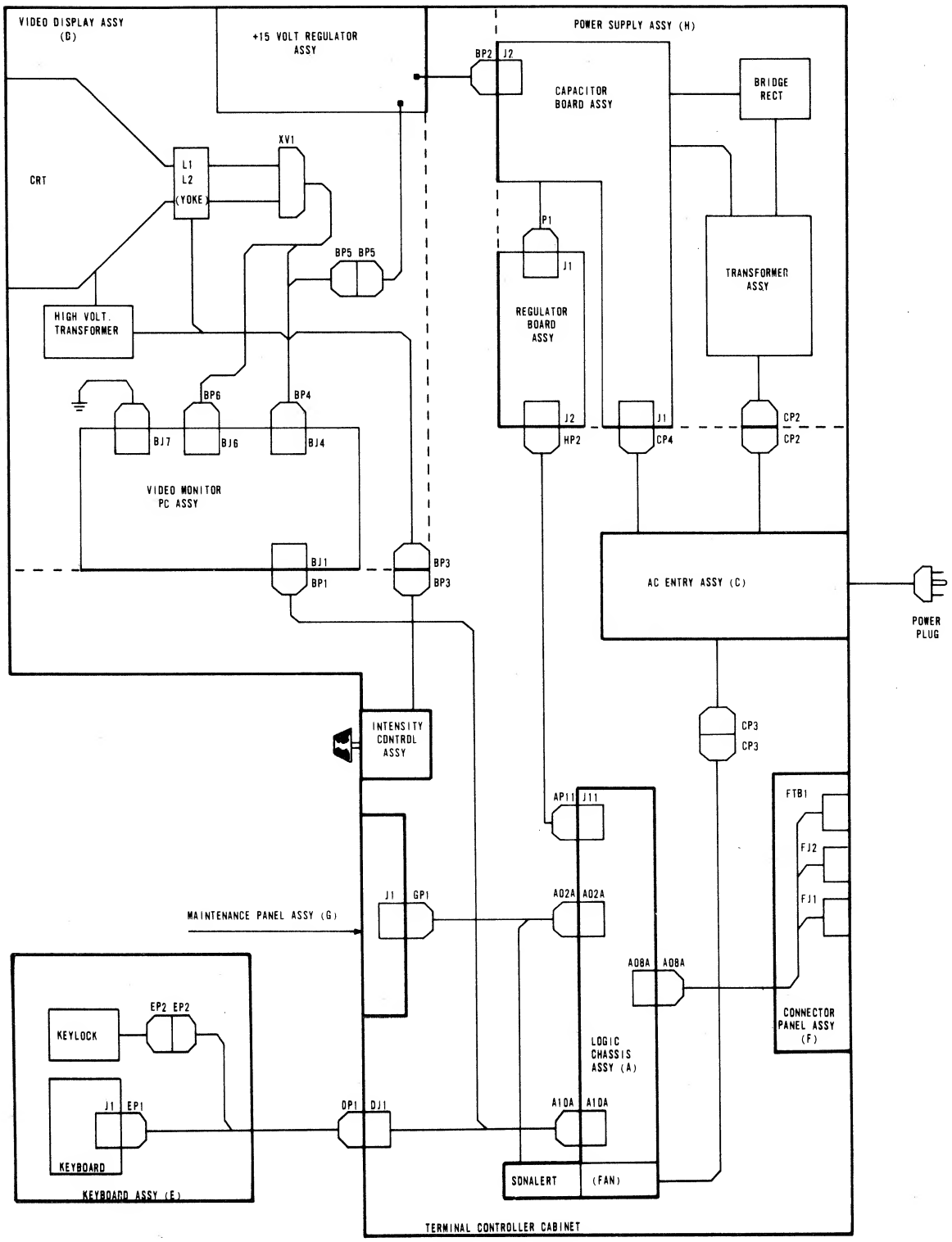

Figure 3-5. Display Terminal Internal Cabling Diagram

c) Display/Keyboard I/F module — Chassis location 10. Twelve switches are contained on this module. From top to bottom they establish the following selections.

Selection and Switch		Normal Setting Nearest Board Edge
Normal or Test Mode Display Enable	(S2-4)	Down (Selects Normal)
Not Used	(S2-3)	Meaningless
Not Used	(S2-2)	Meaningless
AC Frequency Selection 60/50 Hz	(S2-1)	Down (Selects 60 Hz)
Base Memory (RAM) Address of Display Refresh Down Nearest Board Edge = 0		
2^{15}	(S1-8)	Down
2^{14}	(S1-7)	Down
2^{13}	(S1-6)	Down
2^{12}	(S1-5)	Up
2^{11}	(S1-4)	Up
2^{10}	(S1-3)	Down
2^{9}	(S1-2)	Down
2^{8}	(S1-1)	Down
Selects 1800_{16} for initial starting address. Verify this setting with the customer.		

The normal setting for these switches are as indicated in the preceding listing. This establishes a 60-Hz display refresh cycle rate (same as ac power frequency) with the display circuitry enabled under program control. Switches S2-2 and S2-3 are bypassed via backplane wiring to allow program control of odd lines/all lines and 40/80 character display formats. The base memory address for the starting point of display refresh selected by the preceding listed switch settings is 1800_{16}, with the lower 8 bits of the address being all 0's. The selection of the base memory address is dependent upon the firmware program employed in the application with the mentioned 1800_{16} selection pertaining specifically to the Ticketron application. As noted in the preceding listing, verify the base memory address selection with the customer.

e) Modem module — Chassis location 09. If a modem module part number 51912400 is being used in the application of CC617-B, refer to the description of switch-selectable strapping options for this module contained in section 4 to determine the required settings for its operating parameter selection switches for your situation.

6) Connect the interface cable from the keyboard module to the keyboard connector located at the lower right front of the display terminal cabinet. The pin assignments of this connector are contained in appendix A.

7) Connect the applicable interface cables to the connector panel at the rear of the display terminal, see figure 3-6. Refer to appendix A for pin assignments of panel connectors. If the application of the unit being installed is other than that of Ticketron, make sure the interface connections do not exceed the maximum lengths given in the CC617-B portion of section 1, General Description.

8) Place the primary circuit breaker located at the rear of the display terminal in the down position and plug the ac power cord into the site power outlet.

9) Remove the snap-on cover from the maintenance panel at the front of the display terminal and set the data input switches 0 through 7 to the left (logical 0) position.

10) Leave the cabinet hood off and perform the following checkout procedure.

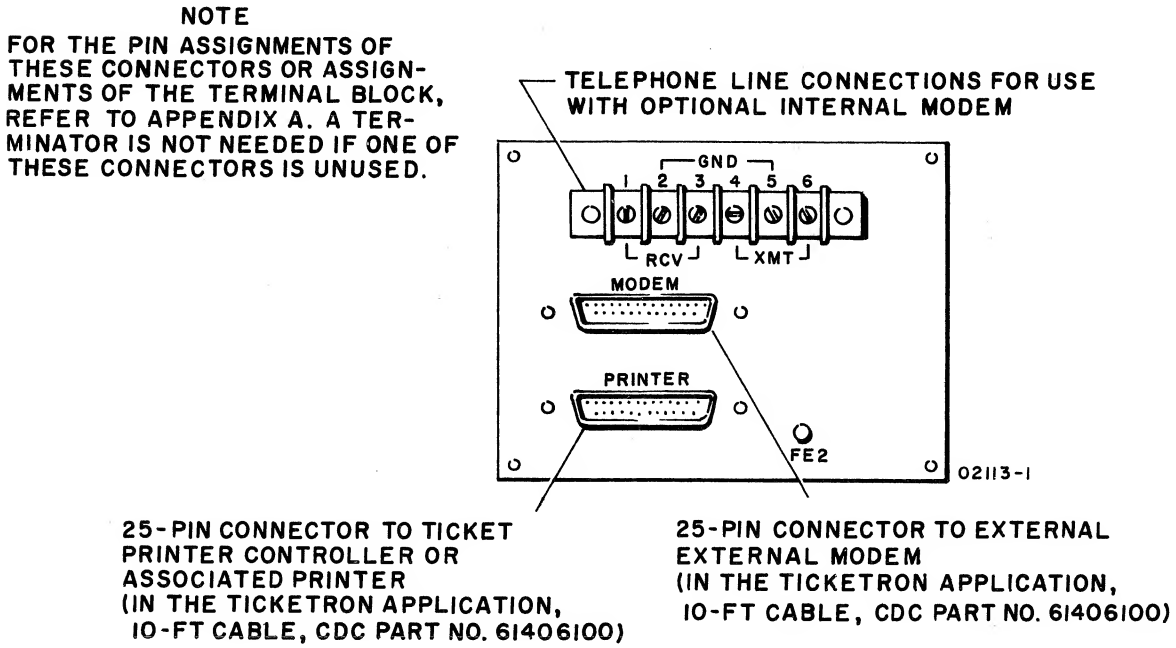

Figure 3-6. I/O Connector Panel

CHECKOUT

The following procedure refers to display terminal characteristics in the area of self-test diagnostics which specifically apply to units containing the fixed firmware program for the Ticketron application. The CC617-B display terminal is unlike the CC617-A in that it may be used in applications other than Ticketron, and thus does not contain a firmware program as an integral part of its configuration. This aspect of CC617-B is application dependent, and if the application of the CC617-B to be checked out is other than that of Ticketron, the characteristics of that unit will probably differ from those referred to in the procedure. Under these circumstances, the customer will have to be conferred with to gain an understanding of the diagnostics employed in that application and any differences between the characteristics of that routine and the one referred to in the procedure, will have to be taken into consideration accordingly.

This procedure only covers the checkout of the display terminal and it assumes that other equipments of the terminal subsystem are installed and operational.

1) Place switch 0 on the maintenance panel to the right (logical 1) position. This disables a downline load of the operating program for offline checks of the display terminal.

2) Turn the INTENSITY control located on the front panel approximately one-half turn clockwise and apply input power by placing the PRIMARY circuit breaker in the up position.

3) Refer to section 6 table titled Printed-Circuit Card Voltage Indicators and verify that all voltage-indicating LEDs located on the PC boards in the logic chassis are lit. Then check the output of the +5-volt regulator at chassis location B01. Refer to procedure CRT12 and measure between the ground and +5-V dc test points at the board edge for a voltage range of +5.0 volts ±0.25 volt. Adjust the potentiometer located at the board edge if the voltage is not within tolerance.

4) Toggle the RESET switch located on the maintenance panel and observe that the quicklook diagnostic runs to completion. All 1's should be displayed in the upper row of indicators (all upper row indicators lit) on the maintenance panel and the display should be filled with D's, indicating successful completion of quicklook.

NOTE

If a quicklook error occurs, refer to table CRT1 in the maintenance section of this manual for corrective action.

5) Adjust the INTENSITY control on the front panel for proper brightness.

NOTE

All procedures are contained in section 6 of this manual. An index at the end of section 6 cross-references the procedure number to the section-6 page number containing that procedure.

6) Observe the display of all D's. If raster is tilted or not centered, perform tilt or centering adjustments of procedure CRT8.

7) Observe the leftmost and rightmost character columns on the screen for correct alignment and sufficient vertical height (similar to characters in center of screen). If adjustment is required, perform steps 9, 10, and 11 of procedure CRT8.

8) Observe that the total display area is approximately 5-1/4 inches high by 8 inches wide and that characters have good contrast. If adjustments are required, refer to procedure CRT8, Monitor Adjustments.

9) To perform ticket printer or matrix printer tests, refer to procedure CRT1, quicklook tests 007 and 010.

10) Return all maintenance panel switches to the logical 0 (left) position.

11) Turn the display terminal input power off (primary circuit breaker down) and replace cabinet hood and maintenance panel cover. This completes the offline checks of the display terminal.

To complete checkout, online system operations should be performed with the aid of the customer to verify that communications and terminal functions are performing correctly. If a malfunction occurs that points to faulty display terminal operation, proceed to section 6 for troubleshooting information.

The maintenance philosophy for the display terminal calls for troubleshooting and parts replacement at the modular level where equipment design permits this approach. Therefore, this section limits itself to the identification and basic functional description of the replaceable modules and subassemblies contained in the display terminal without a detailed analysis of their internal operation. For detailed theory of operation information pertaining to a specific module or assembly, refer to the applicable hardware maintenance manual as listed in the preface of this manual.

The location of the major modules and assemblies within the display terminal are shown in figure 4-1. These are described as to their functional use in the following paragraphs.

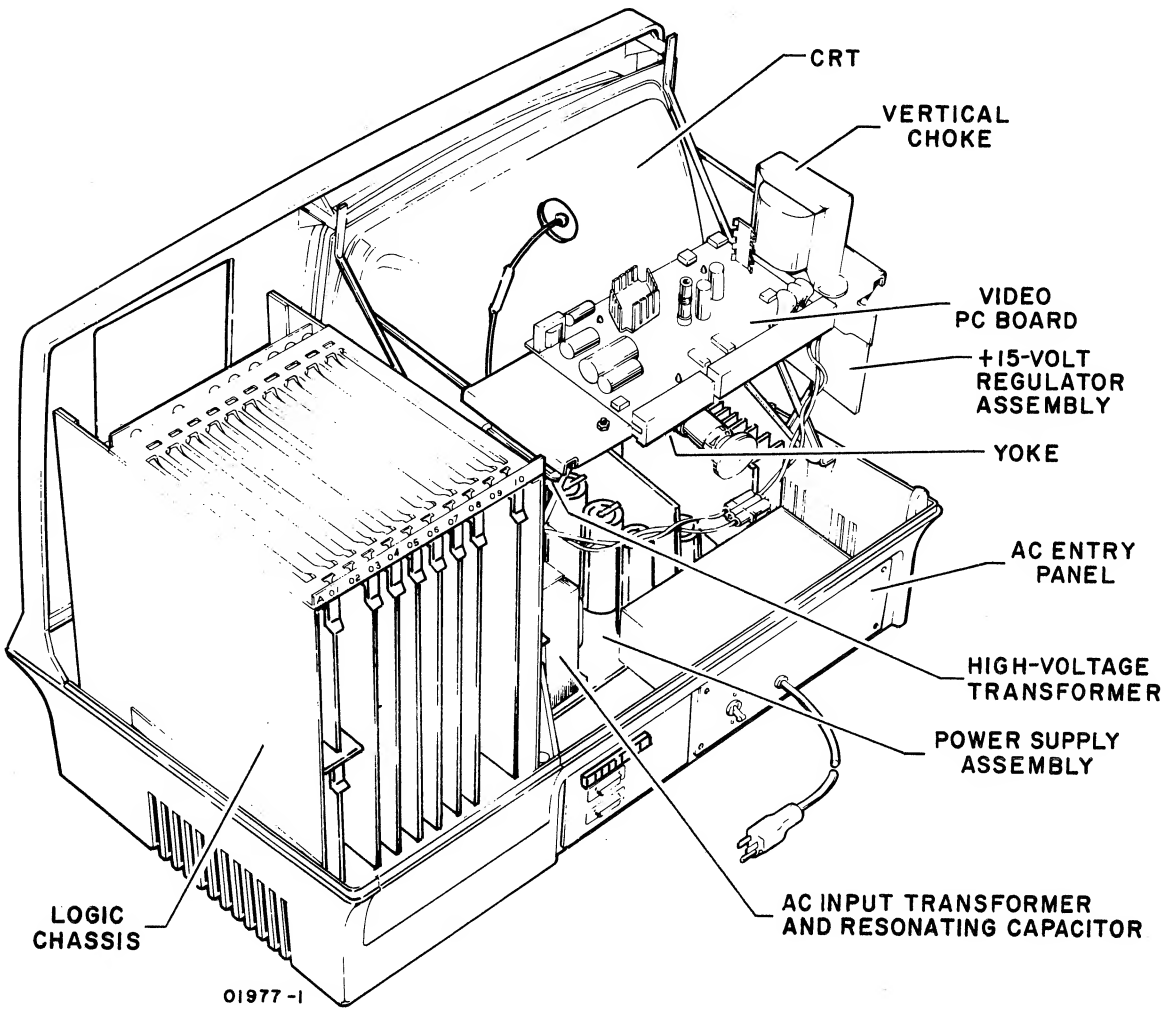

Figure 4-1. Display Terminal Components

VIDEO MONITOR

The video monitor is composed of the following parts:

- CRT
- High-voltage transformer
- Video PC board
- Vertical choke
- Yoke assembly
- +15-V dc regulators

The monitor processes a noncomposite video signal and horizontal sync and vertical sync pulses that are received from the display/keyboard interface PC board contained in the display logic chassis. Refer to the video monitor block diagram shown in figure 4-2.

The horizontal section differs from a normal TV set in that no horizontal or vertical oscillator is used. Therefore, with the absence of horizontal input sync pulses no raster will be present. The output stage of the horizontal section provides the yoke with the proper horizontal scanning current, develops the necessary crt support voltages, and provides B+ for the video amplifier through use of the flyback power supply (13-kV high voltage, 450 V G2 voltage, -190 V brightness/focus voltage, and +45 V for the video B+ voltage.) The vertical section incorporates a parabola generator to linearly deflect the beam in the vertical direction. The video preamplifier requires about 0.5 V at its input before the output responds in a linear fashion. Video amplification is then provided by a class C video amplifier stage.

Internal potentiometers provide adjustment capabilities for gain, height, focus, and vertical linearity. Magnets at the rear of the yoke provide for display centering, and a variable coil provides for horizontal width adjustment. A copper sleeve that slides inside the yoke provides for horizontal linearity adjustment.

CATHODE-RAY TUBE

The crt is a standard 12-inch (diagonal) TV tube fitted with a glare-resistant display screen. The usable display area is 5.2 by 8 inches. The raster and character generator characteristics of the display/keyboard interface PC board provide nominal character sizes of either 0.250 inch high by 0.144 inch wide ±10% in 40-character mode or 0.125 inch high by 0.072 inch wide ±10% in 80-character mode.

The crt is a field-replaceable part of the video monitor. Illustrations and procedures for removal are contained in section 6, procedure CRT7.

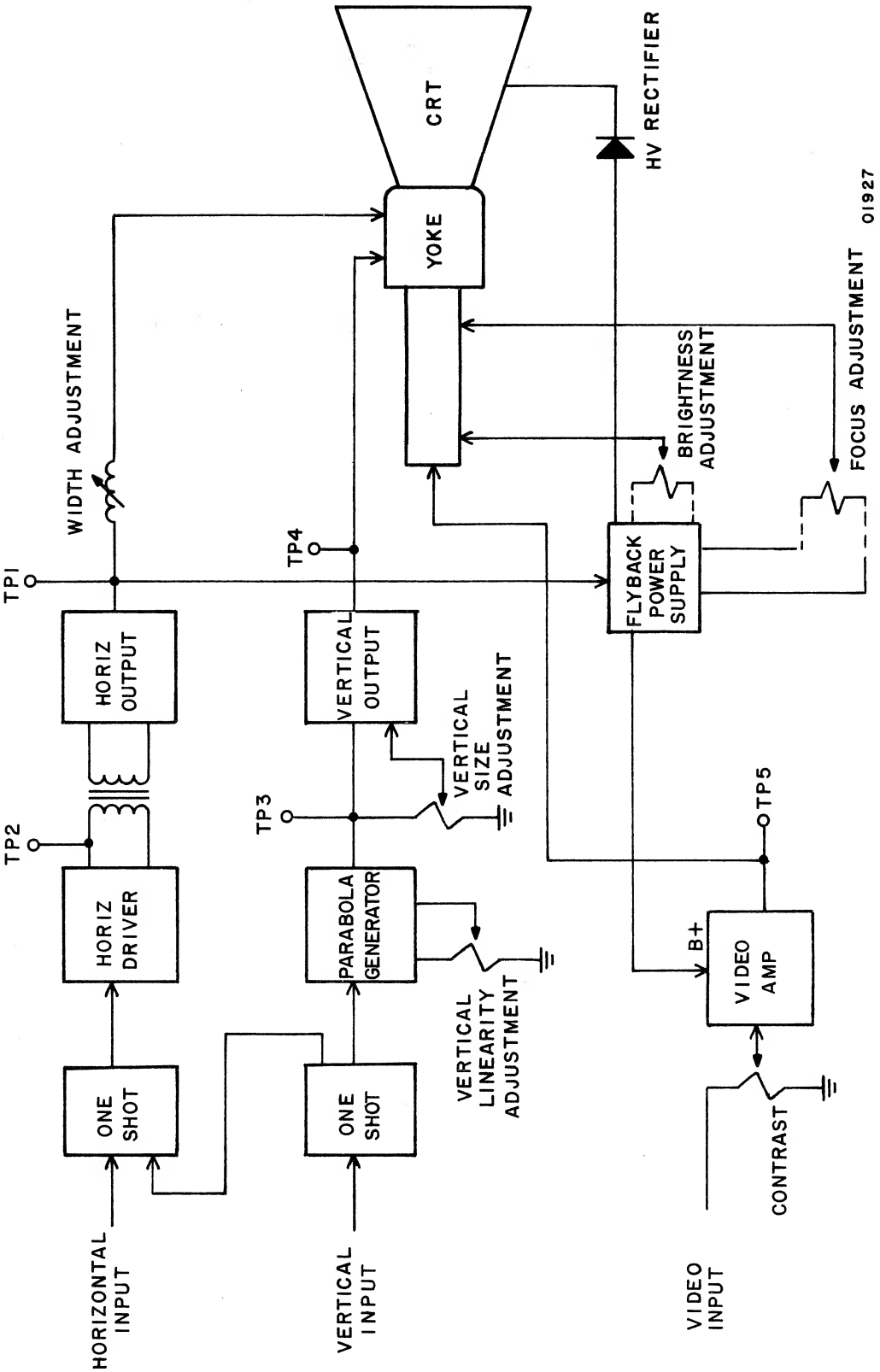

Figure 4-2. Video Monitor Block Diagram

HIGH-VOLTAGE TRANSFORMER

The high-voltage transformer is a field-replaceable component of the monitor (procedure CRT3, section 6). When the high-voltage transformer is replaced, the anode assembly with the high-voltage diode is also replaced.

VIDEO (MONITOR) PC BOARD

The video PC board is a field-replaceable item. Procedures are described in section 6 (procedure CRT5).

The video PC board contains the circuitry required to generate initial high voltages (-190, +45, and +465) required to drive and control the electron beam. The board also contains a +5-V dc regulator and the monitor adjustments used to create clear and distinct characters on the screen (refer to procedure CRT15 for adjustments).

VERTICAL CHOKE

The vertical choke coil is a replaceable item of the video monitor assembly (procedure CRT10). During refresh, the coil plays an important part in directing sweep voltage through the vertical yoke coil and suppressing unwanted oscillations in the vertical output circuit.

YOKE

The yoke assembly is a replaceable item (procedure CRT9). Current flowing through the yoke is precisely controlled in both axes to regulate the amount of deflection taken by the electron beam on its course to the crt phosphor. Adjustment is always required when a new crt is installed (procedure CRT7).

+15-V DC REGULATORS

There are two +15-V dc regulators mounted on the side of the video monitor chassis on a heat sink, see figure 4-1. The regulators maintain a constant +15-V dc supply to the video (monitor) PC board, which uses the voltage to create the high voltage required to drive and control the electron beam.

The regulators create a regulated voltage from the +20-V dc (nominal) generated by the power supply assembly (discussed later). Procedures are provided for checking and replacing the regulators (transistors) in section 6 (procedure CRT4). The regulators are replaced when the no load output measured from the emitter-to-ground is not 15-V dc with a +17.5 to 29-V dc input voltage applied. The collector is connected to ground.

LOGIC CHASSIS ASSEMBLY

The logic chassis contains a 10-slot card cage with a printed-circuit backplane. It houses the +5-volt power supply regulator(s) and the various control and memory modules of the display terminal. Descriptions of the backplane and logic cards contained in the logic chassis are provided in the following paragraphs. The card placement within the logic chassis of the two display terminal models is shown in figure 4-3.

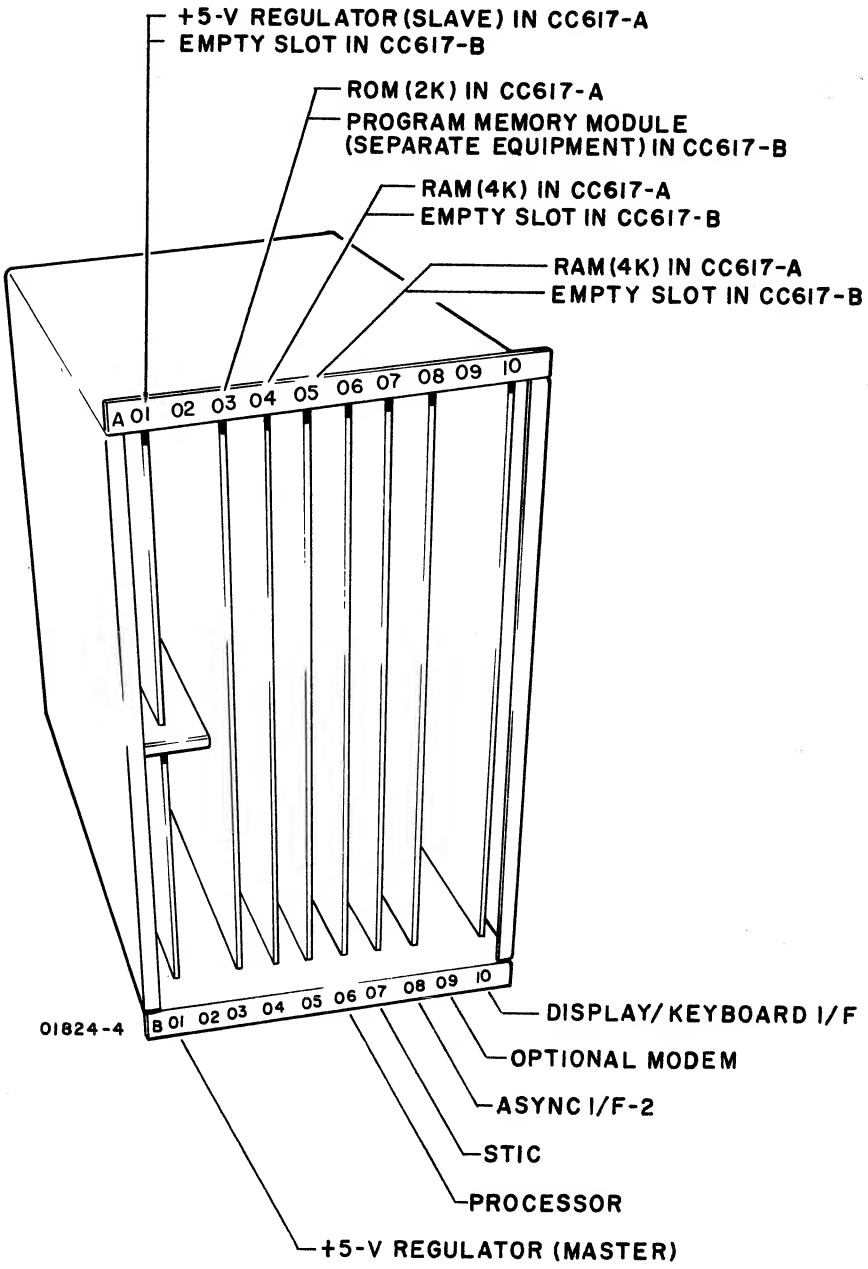

Figure 4-3. Logic Chassis Assembly

BACKPLANE

The backplane is a PC board with connectors for input power and the logic modules. It provides etched signal interconnections between the modules and contains a shared bus for intermodule communication. The signal lines which make up the shared bus are listed on a Bussed Signal Chart contained in section 5. The major signal lines within the shared bus are sixteen Address Bus lines and eight bidirectional Data Bus lines. Because of differences in card placement, the two models of the display terminal use backplanes that have different corresponding interconnection paths.

The shared-bus communications between the processor module and I/O modules (async I/F-2, display/keyboard I/F, and STIC modules) are controlled by the processor module through the use of I/O channels incorporated in the backplane. In this scheme, each I/O module is assigned its own separate channel that carries a unique Channel Strobe signal line which the processor module uses to initiate, address, and provide timing for shared-bus communication transfers. The communication transfers in these situations involve the use of both the Address Bus and Data Bus lines, with the processor module indicating via codes on the lower-order Address Bus lines what type of information (status, function commands, or data) is to be transferred on the Data Bus lines. Also, within each I/O channel is an Interrupt signal line that provides the associated I/O module with the capability of obtaining the attention of the processor module when a program-enabled interrupt condition occurs. The Interrupt signal line of each I/O channel has an assigned priority that determines in what order the processor module recognizes and services them. Monitoring of the interrupts is done by the STIC module.

The selection scheme incorporated in the backplane for shared-bus communications is different between the processor module and memory module(s). Each memory module (or in the case of CC617-B, each memory segment, ROM or RAM) is assigned an address through the use of Module Select lines connected to each module (memory segment). These lines are either tied to ground (low) or left open (high) to form the individual binary address of that memory module (memory segment). When a data bus communication transfer is to occur, the memory module (memory segments) compare the high-order bits of the 16-bit Address Bus word with their backplane-assigned-address to determine to which of them the communication transfer is being directed. The source of the 16-bit Address Bus word depends on the purpose of the communication transfer and is primarily from either the processor module or the display/keyboard I/F module. Communication transfer from the display/keyboard I/F module is for the purpose of obtaining display refresh data from RAM.

In addition to the shared-bus communication connections, common etched interconnections are provided for ground, +5 volts, +20 volts, and -20 volts required for module operation. Power connections are made to the backplane via a 12-pin connector located at the back of the panel.

+5-VOLT REGULATOR(S)

To satisfy the current load requirements of the CC617-A display terminal, two +5-volt regulators, see figure 4-4, and used in the distributive power system. In the CC617-B model, only one +5-volt regulator is used. The regulators convert the unregulated +20-volt output of the power supply assembly to a regulated output of +5-V dc ±0.5 V at a current rating of up to 10 amperes per regulator. The regulator is a voltage-regulating chopper power supply with current limiting and overvoltage sensing. Its action is controlled by a 20-kHz, oscillator-driven integrated circuit (IC) that functions to alternately pass and block a portion of the input voltage to obtain the required output voltage level. For example, with a +20-V dc input, the active on time of the IC is approximately 1/4 of the duty cycle. Its output is used to control or chop the input voltage down to an average of +5 volts at the output of the regulator. The IC output is amplified and fed to a pass-transistor stage that allows the input power to flow through an inductor and charge a bank of capacitors which supplies the +5-V dc output. A portion of +5-volt output is fed back to the IC which monitors the voltage level. An output of less than +5 volts causes the IC to generate a wider control signal output, and values higher than +5 volts shorten the control signal, thereby controlling the conduction time of the pass-transistor.

A manually adjustable, overcurrent-sensing circuit limits current in the +5-volt output. This circuit is normally set to limit current to 110% of maximum, or 11 amperes per regulator. When an overcurrent condition is sensed, it issues a shutdown signal to the IC which drops back the active duty period and results in reduced current flow in the +5-volt output.

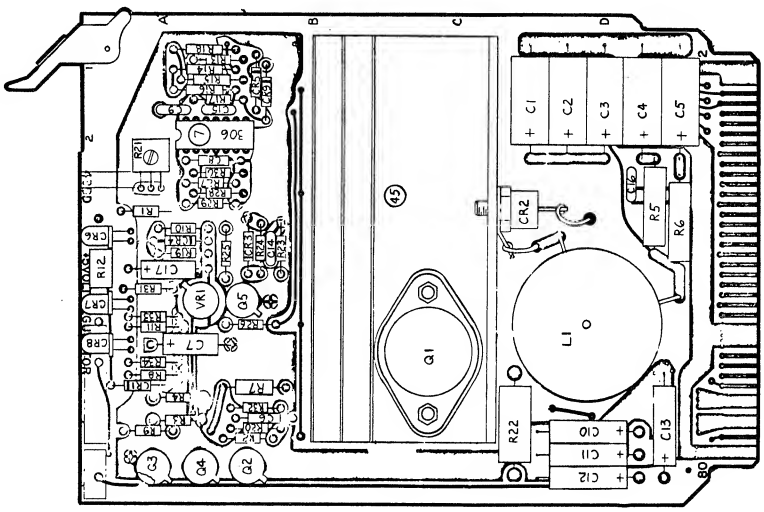

Figure 4-4. +5-Volt Regulator(s)

If the +5-volt output rises from between 5.5 to 6.5 volts, a zener diode conducts to issue a signal to the power supply assembly indicating an overvoltage condition. This signal activates a silicon-controlled rectifier (SCR) which trips the primary circuit breaker causing ac input power to the display terminal to be cut off. The +5-volt output of the regulator is manually adjustable to provide approximately ±10% of its nominal value.

Three LED indicators are provided on the regulator card to indicate presence of the following voltages. The LEDs, however, do not indicate that correct voltages are present, only that a voltage of the proper polarity sufficient to light the LED is available.

- Red — +5-V dc
- Yellow — +20-V dc
- Green — -20-V dc

ROM MODULE OF THE CC617-A MODEL

The read-only memory (ROM) module, figure 4-5, uses erasable, reprogrammable integrated circuits for storage of the firmware program. The basic circuit chip is a 256 8-bit erasable read-only memory (EROM). The ROM module contains eight EROM chips which provide a storage capacity of 2048 8-bit words. The maximum storage capacity of the ROM module is 4096 8-bit words when 16 EROM chips are used.

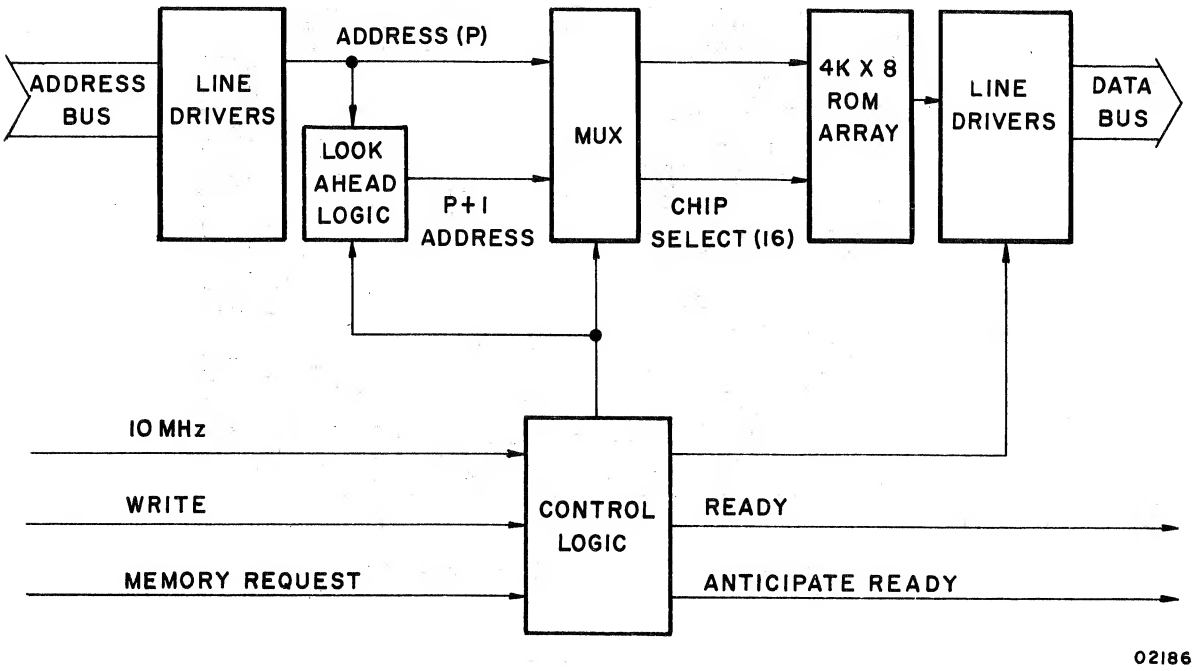

Figure 4-5. Block Diagram of ROM Module Used in CC617-A

When accompanied by a correct 16-bit Address Bus word and a Memory Request, a high logic level on the Write line selects a read from the ROM module. If the Write line is low during such an instance, the module operates the same as if a memory read was occurring, except the Data Bus tristate line drivers are not enabled. Thus, if a module accidentally tries to write to a memory address, the ROM module would respond with a Ready signal but would not store any data, and would not overdrive the bus by activating the Data Bus drivers.

-9-Volt Regulator

The ROM module contains a -9-volt regulator circuit that converts the -20-volt unregulated voltage from the power supply assembly to -9 V ±5%. The -9 volts from this regulator are connected to a backpanel pin and jumpered to other backpanel pins feeding the EROM chips on the module. An LED indicator located at the edge of the module indicates the presence of the -9 V regulated voltage.

Interface Characteristics

Signal interchange occurs via the shared bus. All interface signals are TTL compatible. The signal voltage levels are defined as follows:

0.0 V to 0.8 V = logical 0 input
2.0 V to 5.0 V = logical 1 input
0.0 V to 0.4 V = logical 0 output
2.4 V to 5.0 V = logical 1 output

RAM MODULE OF THE CC617-A MODEL

The RAM module, figure 4-6, provides random-access, read/write storage for up to 4096 8-bit data words plus parity. Two identical modules are used in CC617-A to provide a total storage capacity of 8192 words. The memory access time is 850 nanoseconds and memory cycle time is 950 nonoseconds. The RAM module automatically generates and stores an odd parity bit (2^8) when data is written into memory. A parity error signal occurs if the character parity is even on a memory read.

A functional diagram of the RAM module is shown in figure 4-7. The RAM modules are used by the processor module for read/write storage, and the display/keyboard I/F module for the reading of display refresh data. Each RAM module contains 36 RAM chips. Each chip provides 1024 1-bit storage locations. During read/write operations, the chips are selected in groups of nine.

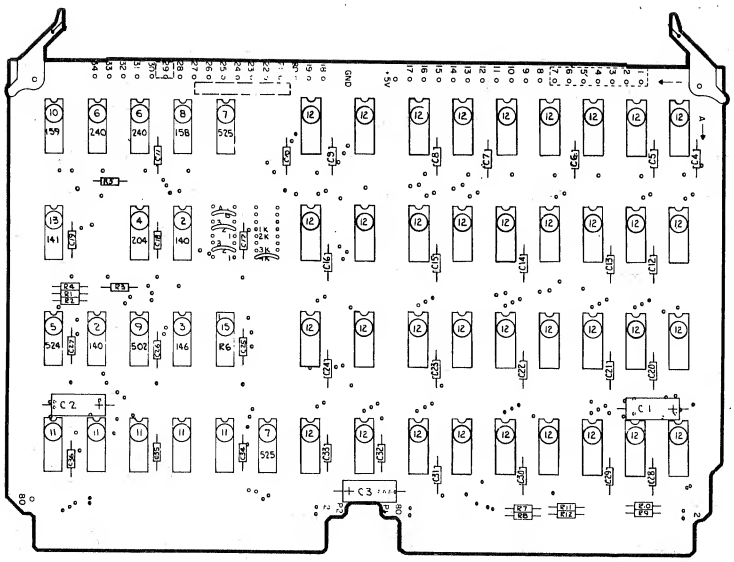

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Figure 4-6. RAM Module Used in CC617-A

Address Select

A 16-bit Address Bus word from either the processor module or display/keyboard I/F module selects a RAM module, a group of nine RAM chips in the module, and a specific 9-bit word location within the group. The Address Bus lines 2^{12} - 2^{15} are used for comparison with the Module Select lines. The Module Select lines 2^{0} - 2^{3} are jumpered to provide the desired module address. A comparison between the Address Bus lines 2^{12} - 2^{15} and the fixed value of the Module Selects lines 2^{0} - 2^{3} is made on receipt of a Memory Request signal. The RAM module ignores the Memory Request if a no compare condition exists.

Memory Request

The Memory Request signal indicates that a read or write to memory is to occur. If the address on the Address bus selects the RAM module, the module initiates a memory cycle.

Data Bus Lines

The Data Bus lines 2^{0} - 2^{7} are tristate, bidirectional. During a memory write, they contain the 8-bit word to be stored. For a memory read, the RAM module places the 8-bit word from the addressed memory location on the Data bus. The RAM module line drivers are in a high impedance state unless a memory read is in process.

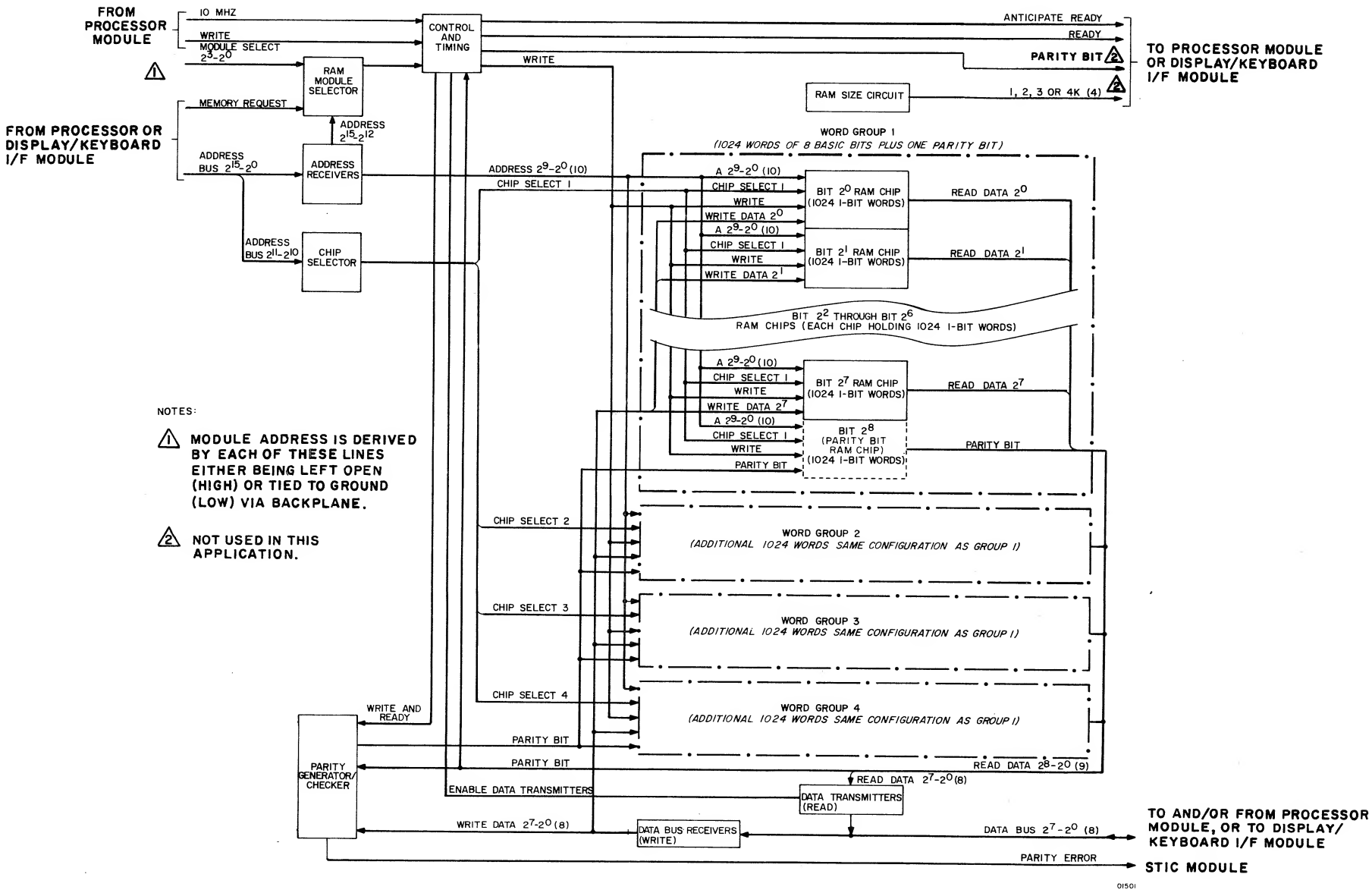


Figure 4-7. Functional Diagram of RAM Module Used in CC617-A

Ready

The Ready signal, in write mode, indicates that the 8-bit word on the Data Bus has been stored in memory. In read mode, it indicates that the contents of the addressed word is stable on the Data Bus.

Anticipate Ready

The Anticipate Ready signal, in write mode, indicates that the write memory cycle will be finished within 200 nanoseconds. In read mode, it indicates that read data will be stable on the Data Bus within 200 nanoseconds.

Write

The write signal selects either a read or write operation. A low logic level indicates a write to memory; a high logic level indicates a read from memory.

Interface Characteristics

All RAM module interface signals are TTL compatible and occur via the shared bus. The signal voltage levels are defined as follows:

0.0 V to 0.8 V = logical 0 input
2.0 V to 5.0 V = logical 1 input
0.0 V to 0.4 V = logical 0 output
2.4 V to 5.0 V = logical 1 output

PROGRAM MEMORY MODULE OF THE CC617-B MODEL

The program memory module mated with the CC617-B display terminal is a separate piece of equipment. The memory module consists of a single logic card containing both ROM and RAM memory with circuitry that interfaces the memory with the processor module and the shared bus. Stored within the ROM is a fixed firmware program for the application that dictates the functional characteristics of the host display terminal. The RAM provides the tempory memory necessary for storage of the applications program loaded into RAM during display terminal initialization and for storage of display refresh data. The storage capacity of the ROM and RAM are as follows:

- ROM — up to 6144 8-bit words made up of 1024 8-bit word increments, with the actual capacity dependent on the requirements of the firmware program used in the application.
- RAM — 8192 9-bit words (8 data bits plus a parity bit).

The parity bit employed by the RAM is self-generated and self checked. Each time a word is written into the RAM, the program memory module automatically generates and stores an even parity bit (2^8) with the data word. When a word is read from RAM, the module performs a parity check and if the parity is not correct, a Parity Error signal is issued to the STIC module causing the MPE (memory parity error) indicator on the maintenance panel to light. This condition is cleared by program intervention via the processor module or by the performance of either a power-on master clear or manual reset.

Selection of the ROM or RAM by the processor module is accomplished through use of the 16-bit Address Bus word. The 2^{13} - 2^{15} bits of the address word select the memory segment, ROM and RAM, and the low-order bits of the word select the specific word location within the segment. The address assigned to the ROM, by way of the logic chassis backplane, is through the use of Module ROM Select lines 2^1 - 2^3 which are connected to the program memory module. These lines are left open on the backplane, resulting in a high or logical 1 being reflected on each of them. The 2^1 - 2^3 Module ROM Select lines correspond to the 2^{13} - 2^{15} bits of the Address Bus word, making the ROM address from $E000_{16}$ to $F7FF_{16}$. Likewise the address assigned to the RAM is derived from the Module Ram Select lines 2^1 - 2^3 connected to the program memory module. In this case, these lines are all tied to ground (low or logical 0) by the backplane, thus making the RAM address from 0000_{16} to $1FFF_{16}$. In addition to its use by the processor module, this memory select scheme is also used by the display/keyboard I/F module for obtaining display refresh data from the RAM.

Memory Write and Read

The employment of the ROM and RAM addresses by the program memory module occurs when a shared-bus Memory Request signal is received. This causes the program memory module to compare the fixed value of the Module Select lines for each memory segment with the 2^{13} - 2^{15} bits of the 16-bit Address Bus word to determine which memory segment is being addressed. Next the program memory module samples the shared-bus Write signal line to determine if the subsequent operation is to be a read or, as in the case of RAM, a write (a low level on the Write signal line indicates a write to memory, and a high level indicates a read from memory). If the operation is to be a memory read, the program memory module places the 8-bit word from the selected memory location on the bidirectional Data Bus lines and activates the shared-bus Ready signal to indicate that the word is ready for sampling. If the operation is to be a memory write, as in the case of RAM, the program memory module stores the 8-bit word from the Data Bus lines in the selected memory location and activates the Ready signal to indicate that storage of the word has been completed.

All ROM read operations are done by the processor module, with several instances where the STIC module is involved. These instances occur at the start of display terminal initialization, when the origin of the 2^{12} - 2^{15} bits of the Address Bus word is from the high core jump control circuit of the STIC module instead of from the processor module. The operation of this STIC module circuit is discussed later in the section.

RAM read operations are done by both the processor module and the display/keyboard I/F module. In the case of the display/keyboard I/F module, the read operations from the RAM are under control of the processor module, and are only for the purpose of obtaining display-refresh data. The 16-bit Address Bus word used in reading display-refresh data, originates from the display/keyboard I/F module, as does the Memory Request signal. The Write signal has no provisions provided for its activation/deactivation by the display/keyboard I/F module. This signal originates only from the processor module and since the idle state of the line is a high level (indicating a memory read), it is impossible for the display/keyboard I/F module to accidentally write to a RAM address. All RAM write operations are done exclusively by the processor module.

Physical Layout

The physical layout of the program memory module is shown in figure 4-8. Pointed out in the figure are the locations of the RAM integrated-circuit chips and the locations of the sockets where the ROM integrated-circuit chip(s) of the application are inserted. There is a total of 18 RAM chips on the module. Each RAM chip provides 4096 1-bit storage locations. In read/write operations, the chips are selected in groups of none. Each ROM chip, plugged into the module, has a storage capacity of 1024 8-bit words. As previously mentioned, the size of ROM storage or number of ROM chips contained on the module is dependent on the requirements of the firmware program used in the application.

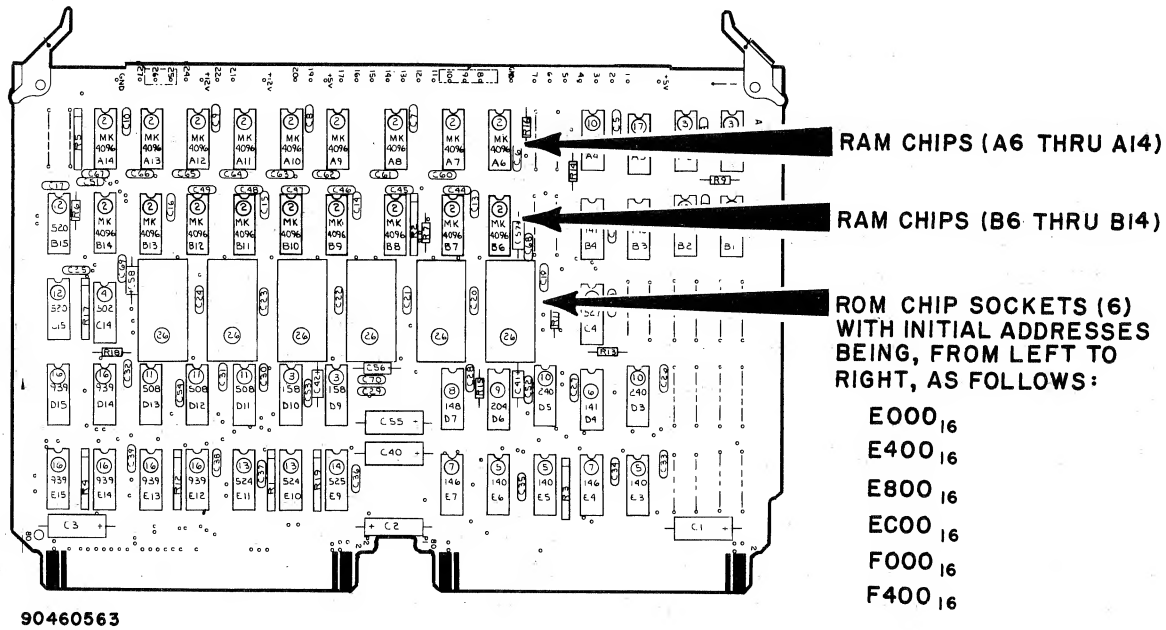


Figure 4-8. Program Memory Module Used in CC617-B

Interface Characteristics

Signal interchange occurs via the shared bus. All interface signals are TTL compatible. The signal voltage levels are defined as follows:

0.0 V to 0.8 V = logical 0 input
2.0 V to 5.0 V = logical 1 input
0.0 V to 0.4 V = logical 0 output
2.4 V to 5.0 V = logical 1 output

PROCESSOR MODULE

The processor module, see figure 4-9, is an 8-bit-per-byte parallel microprocessor that governs the control of the display terminal by retrieving and executing program instructions stored in the ROM and RAM. Responsibilities for the module include access control to the RAM for the entry and retrieval of data, and control over the shared bus that carries all intermodule communication transfers. Its communications with the higher-level processor of the system and with an associated printer device in the application, is through the asynchronous interface module. Its communications input from the display terminal keyboard is through the display/keyboard I/F module, while its communications with the maintenance panel, is through the STIC module. Once the processor module circuits are initiated to perform an operation, they are the controlling entity for sequences (such as, communications, calculations, etc.), that are necessary to complete the particular operation. The processor module circuits secure any needed information from the associated program — store memory and execute such information, utilize RAM as required (for temporary storage), and request/accept/transmit I/O communications associated with the operation.

The processor module has no operating controls or switches. Located at the outer edge of the board are two LEDs that indicate the presence of two internally regulated voltages. These voltages are derived from the +20 and -20 voltage outputs of the power supply assembly. A yellow LED glows when +12 V is present and a green LED glows when -5 V is present.

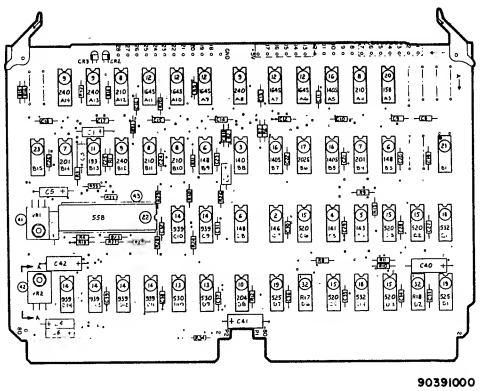


Figure 4-9. Processor Module

The major functional areas of the processor module are shown in figure 4-10. Their primary functions are described in the following paragraphs.

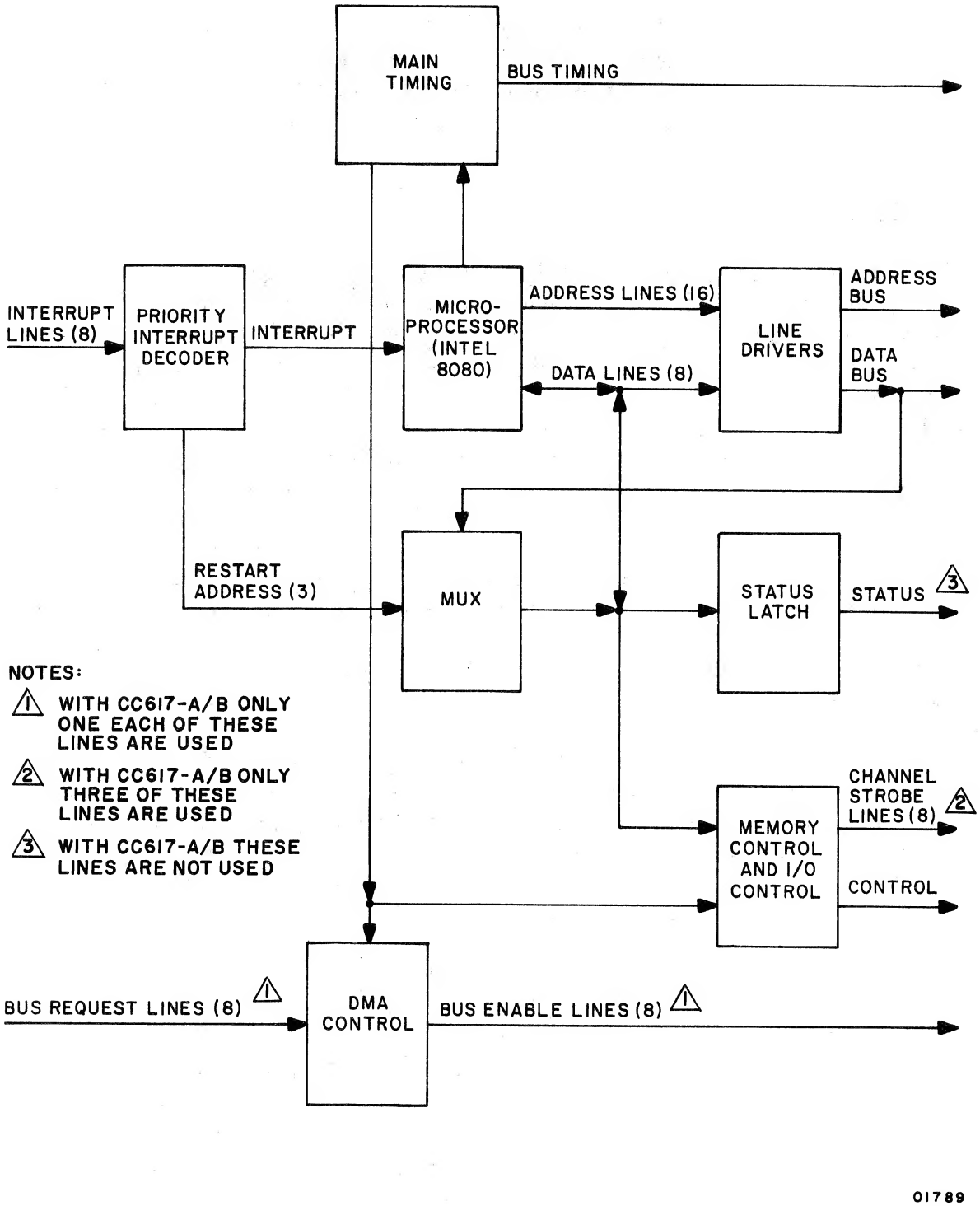


Figure 4-10. Processor Module Functional Diagram

Main Timing

These circuits generate the master timing required for all processor module operations. Timing is initiated by a 20-MHz oscillator which drives a 5-bit ring counter and various other timing pulse generation circuits. The resulting outputs govern not only internal module operations but also supply timing to the other modules on the shared bus to synchronize their operation with that of the processor module.

Microprocessor

The microprocessor functional area of the module consists of a single integrated circuit chip (Intel 8080 or equivalent) which recognizes and executes approximately 100 instructions. The means by which it obtains program instructions from memory and performs its duties in their execution, is through the receipt and issuance of communication transfers via the shared bus. The microprocessor sends/receives 8-bit word transfers via the bidirectional Data Bus lines and generates the proper Address Bus signals for these transfers to be performed. Included in its duties is the processing of interrupts in coordination with the priority interrupt decoder circuits of the module, shared bus control, and the governing of Channel Strobe/Memory Request signal generation by the memory and I/O control circuits of the module.

Priority Interrupt Decoder

These circuits recognize the various interrupts which are received through the STIC module. They receive up to eight interrupts, store their presence, generate a Restart Address (Trap Address in RAM from which the processor module obtains information to process the unique interrupt) corresponding to the highest priority interrupt stored, and notify the microprocessor that an interrupt is waiting to be processed. The interrupt conditions are sampled once every 50 nanoseconds if no interrupt is currently being processed by the processor module.

Multiplexer

The multiplexer (mux) selects either an 8-bit Data Bus word or a Restart Address (for interrupt processing only) for input to the microprocessor.

Direct Memory Access (DMA) Control

These circuits control the display/keyboard I/F modules use of the shared bus for access to the RAM. Each time a data character is to be read from the RAM for display refresh, the display/keyboard I/F module issues a Bus Request signal. If no communication transfer on the shared bus is in process, these circuits receive and store the request and respond with a Bus Enable signal to allow access to the RAM. The sampling of the Bus Request line under these conditions occurs once every 250 nanoseconds.

Memory and I/O Control

These circuits generate the signals that accompany a shared-bus commumication transfer. With exception of the display/keyboard I/F module's use of the shared bus in obtaining display refresh data from the Ram, all shared-bus communication transfers are initiated by the processor module and require some of the signals which these circuits generate. In the case of a shared-bus transfer with an I/O module, these circuit generate the unique Channel Strobe signal for the I/O channel in which the I/O module is connected to via the logic chassis backplane. This action serves to initiate the transfer, address the transfer, and provides the timing for the transfer. Included with this action and with all processor module-initiated shared-bus transfers, is the setting of the shared-bus Write signal line by these circuits to denote in which direction the information flow is to occur. A high level on the Write line indicates that the information transfer will be from the addressed I/O module to the processor module, and a low level on the Write line indicates the opposite. The type of information (status, function commands, or data) which is to be transferred on the bidirectional Data Bus lines, is specified via a code placed on the Address Bus lines by the microprocessor. Also handled by these circuits, is the receipt of the corresponding response from the addressed I/O module to the Channel Strobe signal. Depending upon the state of the Write signal line, receipt of the response indicates that the information eigher is being received or is being placed on the Data Bus.

In the case of a shared-bus communication transfer with ROM or RAM, the operation of these circuits is much the same as previously described with the only major difference being the circuits generate a shared-bus Memory Request signal instead of a unique Channel Strobe signal. In this case, the selection of a memory module (with CC617-B, a memory segment, ROM or RAM) is accomplished through the 16-bit Address Bus word that is generated by the microprocessor, with its high-order bits signifying the address of the memory module or segment.

Status Latch

The outputs of this circuit are not used in CC617-A/B.

Line Drivers

These circuits consist of three-state buffer/drivers which transmit Address Bus and Data Bus signals to the shared bus. The three states possible on the output lines are high, low, or floating.

Interface Characteristics

The general interface between the processor module and the other logic modules of the display terminal is shown in figure 4-11.

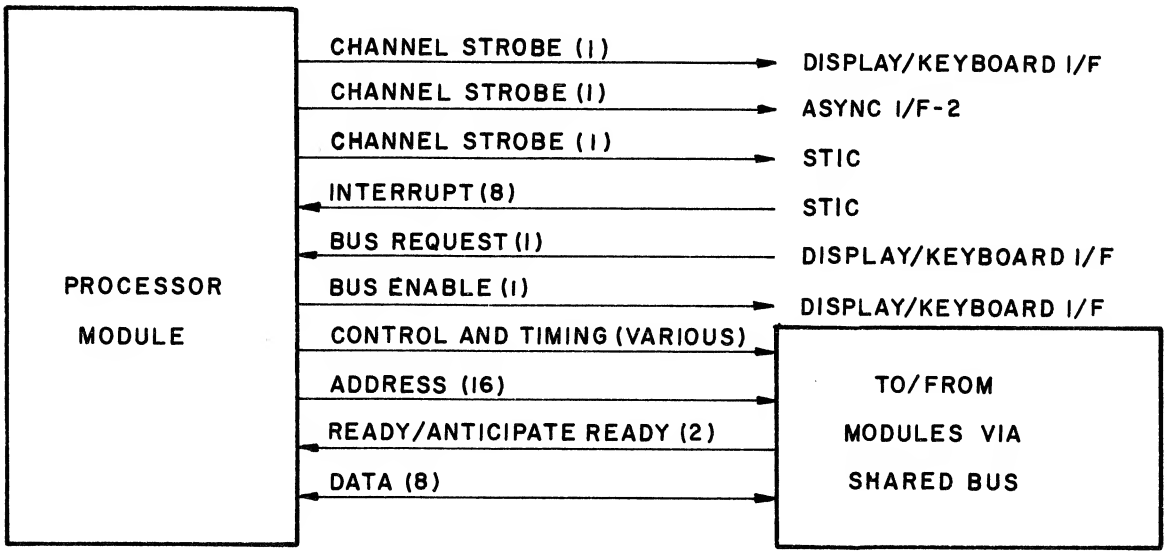


Figure 4-11. Processor Module Interface

The interface signals are either TTL two-state (high or low) or TTL three-state (high, low, or floating). Those signals which may be in the floating condition are placed insuch condition when the processor module requests that one of the other modules on the shared bus place logic high/low information on the signal lines. Interface signal logic levels are defined as follows:

Inputs: 0.0 V to 0.8 V = logical 0
2.0 V to 5.0 V = logical 1

Outputs: 0.0 V to 0.4 V = logical 0
2.4 V to 5.0 V = logical 1

STIC MODULE

Basically, the STIC module, see figure 4-12, preprocesses I/O information for the processor module. It connects, to the processor module via the shared-bus eight dedicated Interrupt lines and an I/O channel. All interface operations are under processor module control. The STIC module provides the following functional features:

- Processor module interface with the maintenance panel
- Monitoring of other I/O module interrupts
- Interrupt mask that allows the processor module to control which interrupts it will receive through the STIC module
- Special timing for use by the async I/F-2 module
- Interval timer with a 212.2 millisecond cycle time for generation of interval timer interrupts to the processor module for real time program applications
- Display terminal site address switches
- RAM parity error monitoring for the purpose of gnerating a parity error interrupt to the processor module and for energizing the MPE indicator on the maintenance panel
- Auxiliary output register for storage by the processor of program selections such as that of the display format

A functional diagram of the STIC module circuits is shown in figure 4-13. All functional blocks shown on the left-hand side of the figure are receiving circuits for the particular input signals entering from I/O channels, maintenance panel, memory, etc. All functional blocks shown on the right-hand side are transmitting circuits that issue the particular output signals identified in the figure. The following paragraphs describe those functions identified at the center of figure 4-13.

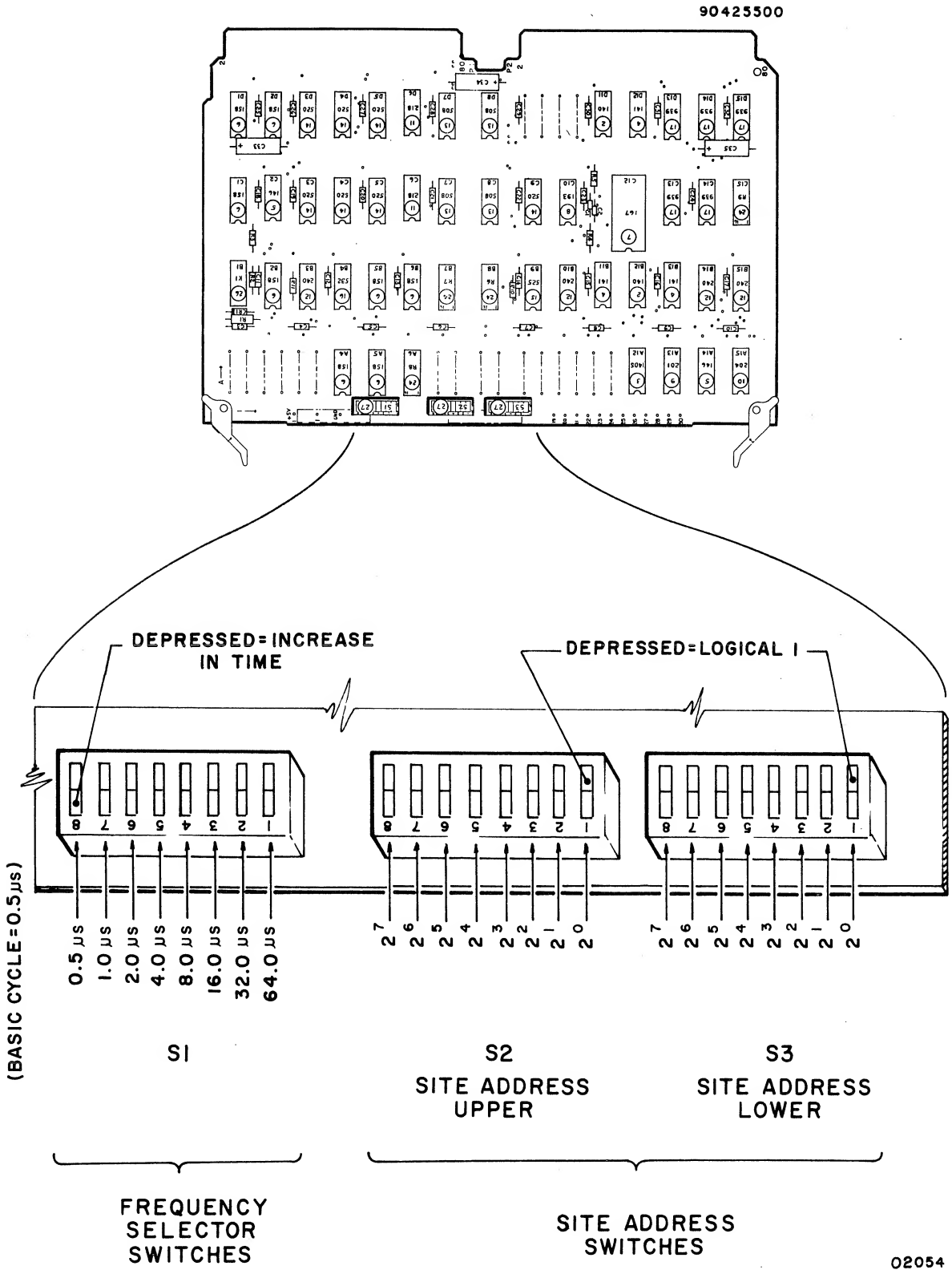
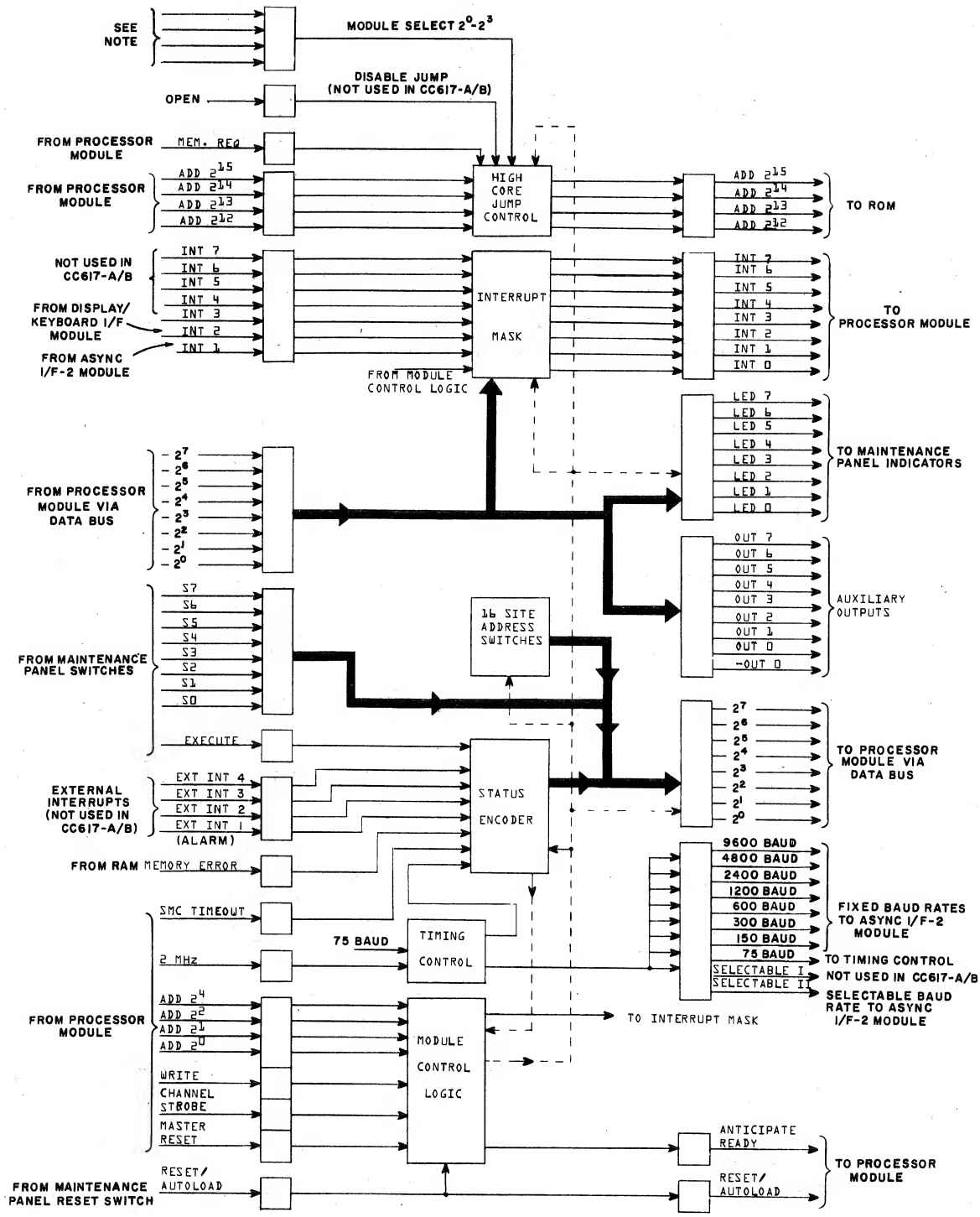


Figure 4-12. STIC Module and Control Switches



NOTE: HIGH CORE JUMP ADDRESS IS DERIVED BY EACH OF THESE LINES EITHER BEING LEFT OPEN (HIGH) OR TIED TO GROUND (LOW) VIA BACKPLANE. IN CC617-A/B THEY ARE ALL LEFT OPEN TO REPRESENT AN ADDRESS OF $FXXX_{16}$.

Figure 4-13. STIC Module Functional Diagram

High Core Jump Control

The purpose of this circuit is to provide a set high core address to the ROM during the first three memory read operations of display terminal initialization. In effect, this action leads the processor module into the firmware program. The circuit begins its operation following a power-up or manual reset, and ends after the third initial memory read operation has been performed by the processor module. During these initial memory read operations, the circuit places the content of the STIC module's Module Select lines 2^0 - 2^3 on the 2^{12} - 2^{15} bit lines of the 16-bit Address Bus word. In doing this, the 2^{12} - 2^{15} bits of the 16-bit Address Bus word originated by the processor module are overridden. All of the STIC module's Module Select lines are left open (high) on the backplane, so the resulting ROM address is $FXXX_{16}$.

Interrupt Mask

The interrupt mask circuit allows the processor to control which interrupts it will receive through the STIC module via the individual Interrupt 0-7 lines. In the case of CC617-A/B, only the Interrupt 0, Interrupt 1, and Interrupt 2 lines of this group have any significance. As can be seen in figure 4-13, the Interrupt 1 line from the STIC module to the processor module, corresponds to the Interrupt line that originates from the asynchronous I/F-2 module. In the same manner, the Interrupt 2 line corresponds to the Interrupt line that originates from the display/keyboard I/F module. In each instance, an interrupt condition occuring in either of these I/O modules will cause a corresponding interrupt to be issued to the processor module if they are not masked. In the case of the Interrupt 0 line, the source is the STIC module itself, and when an interrupt condition occurs in the STIC module, this Interrupt line is activated if it is not masked.

The interrupt conditions of the STIC module differ from those of the other I/O modules in that they are extremely varied in nature. They are briefly described as follows:

- Activation of the EXECUTE switch on the maintenance panel
- Occurence of a RAM parity error
- Occurence of an internal timeout condition within the processor module when the processor module is waiting for a response from a memory or I/O module during an attempted shared-bus communication transfer
- Occurence of the end of the cycle time of the STIC module's 212.2-millisecond interval timer

The means by which the processor module can differentiate between these STIC interrupt conditions is through the use of the status encoder.

Status Encoder

This circuit constantly monitors the conditions that represent an interrupt condition in the STIC module so that this information can be transferred to the processor module via the Data Bus lines during a status function. Because of the great possibility that more than one STIC module interrupt condition may exist at the time when this information is transferred, a priority is assigned to each interrupt condition and the highest priority interrupt condition present is the one that is conveyed to the processor module. The priority of the STIC module interrupt conditions are as follows:

1) RAM parity error (highest priority)
2) processor timeout
3) interval timer
4) EXECUTE switch (lowest priority)

Site Address Switches

These two-position toggle switches, see figure 4-12, allow manually setting a 16-bit site address for the terminal. The switches are set to a logical 0 by pressing the rocker switch so it toggles down toward the circuit card edge.

Timing Control

The major circuits in this category are the 212.2-millisecond interval timer, which has been previously mentioned; the fixed-frequency generation circuits that provide the async I/F-2 module with the fixed 150, 300, 600, 1200, 2400, 4800, and 9600 baud rate timing signals; and the variable frequency generation circuit (controlled by the eight frequency selector switches) that provides the async I/F-2 module with an alternative baud rate timing signal when the rate of communications is not at the same rate as one of the fixed baud rate timing signals. The frequency selector switches, see figure 4-12, are provided to establish variable selectable baud rates for the async I/F-2 module. These two-position switches, when toggled down towards the edge of the circuit card, increase the frequency being issued. The basic time period is 0.5 microsecond, and each switch enabled provides an additional time increase as follows:

Basic period	0.5 microsecond
Switch 8	0.5 microsecond
Switch 7	1.0 microsecond
Switch 6	2.0 microseconds
Switch 5	4.0 microseconds
Switch 4	8.0 microseconds
Switch 3	16.0 microseconds
Switch 2	32.0 microseconds
Switch 1	64.0 microseconds

For example, if a frequency for 2400 baud is desired, then:

Baud rate = 2400 bits per second
Frequency required = 2400 x 16 = 38,400 Hz
(where 16 is a multiplier inherent in the asynchronous logic circuit)

$$\text{Period} = \frac{1}{38{,}400} = 26.0 \text{ microseconds}$$

Therefore, switches 3, 4, 7, and 8 are used to select a total time period of 25.5 microseconds plus the basic time period of 0.5 microsecond = 26.0 microseconds for the desired 2400 baud rate.

Module Control Logic

Basically, the STIC module control logic consists of circuits which recognize when a shared-bus communication transfer is directed to the STIC module and determine the action that should be taken by the module in the transfer.

Interface Characteristics

The signal interchange between the processor module and STIC module occurs via the shared bus, the dedicated Interrupt 0-7 lines, and an I/O channel assigned to the STIC module through the logic chassis backplane. The few signals that occur between the STIC module and the ROM and RAM are also via the shared bus. Interrupts from each of the other I/O modules of the logic chassis are carried to the STIC module on the Interrupt line of their I/O channel. All other signal interchange, such as between the STIC module and maintenance panel or STIC module and async I/F-2 module, is via dedicated signal lines in the backplane. Most of the shared-bus

interface signals are TTL three-state (high, low, or floating), with the remaining shared bus signals and all of the other interface signals being TTL two-state (high or low). The TTL two-state signals are defined as follows:

Inputs: 0.0 V to 0.8 V = logical 0
2.0 V to 5.0 V = logical 1

Outputs: 0.0 V to 0.4 V = logical 0
2.4 V to 5.0 V = logical 1

The TTL three-state signals have the following characteristics:

- Logical 1 = low impedance to +5 V.
- Logical 0 = low impedance to ground.
- Floating (indeterminate) = high impedance to both +5 V and ground.

ASYNC I/F-2 MODULE

The asynchronous interface module, see figure 4-14, contains two switch-selectable baud-rate communication ports that act to interface the processor module with the higher-level processor of the system via the modem and communications telephone line, and with the printer device, which may be associated with the display terminal via the interface cable leading to the printer. Through these two ports, the async I/F-2 module performs all the external receive and transmit of the display terminal, all of which are under control of the processor module. Although the async I/F-2 module has the capability of handling either TTL level or RS-232-C compatible level signals on its two ports, only the RS-232-C level signals are used in its application in CC617-A/B.

The async I/F-2 module connects with the processor module via the shared bus and an I/O channel. It also has dedicated backplane connections leading to the maintenance panel from its port A which is connected to the modem. These lines are used to show the status of communications on this port by causing the appropriate indicators to be lit. Its other intermodule connections are with the STIC module for the purpose of receiving the fixed 150, 300, 600, 1200, 2400, 4800, and 9600 baud rate and variable frequency baud rate timing signals from the STIC module. These baud rate signals from the STIC module correspond to the selections that are available for each port by the setting of the six switches shown in figure 4-14. These switches are divided into two segments, one for each port. During installation, each of the switch segments is set to match the rate of external communications that are to occur on the port. If the rate of communications for a port cannot be matched by one of the fixed baud rate switch selections, the switches of that segment are set to the variable frequency selection (all pressed down nearest board edge) and the frequency selector switches on the STIC module are set appropriately to match that particular communication rate.

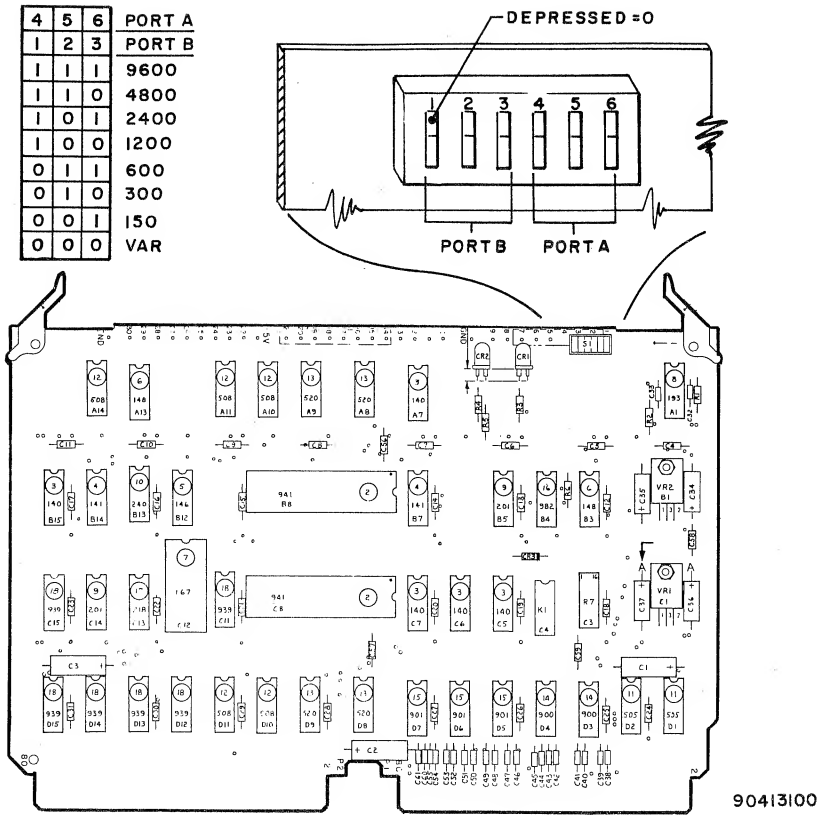
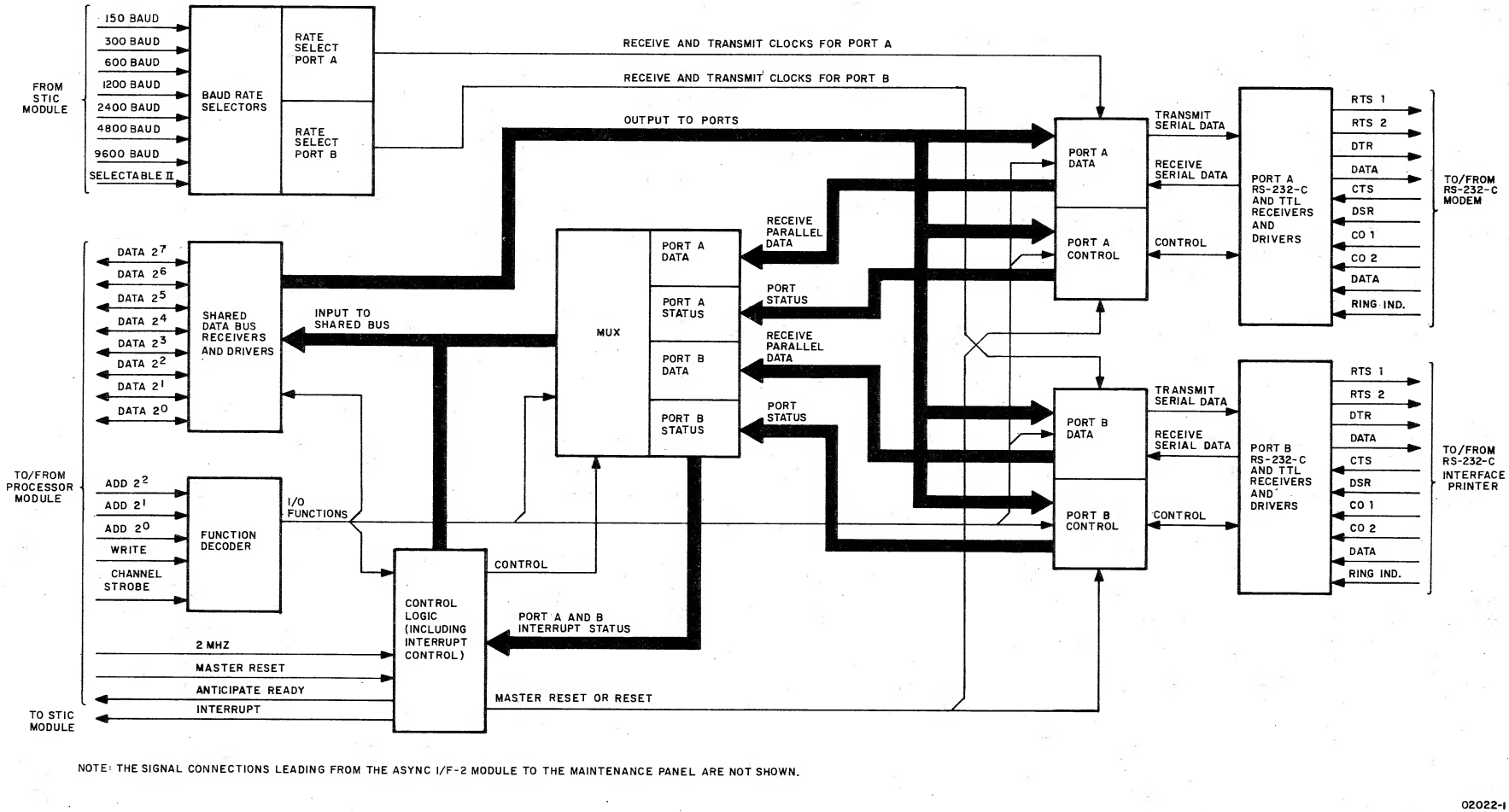


Figure 4-14. Async I/F-2 Module

For the purpose of reference, a block diagram of the async I/F-2 module is shown in figure 4-15. The major functions that are performed by the module include the following:

- Converts serial, RS-232-C level data received from the modem or printer to parallel TTL level data acceptable for handling by the processor module during receive operations and vice versa during transmit operations.
- Checks received data characters for the type of parity (odd, even, or none) that the firmware program of the application dictates through the processor module, and adds the appropriate parity bit to data characters that are to be transmitted.
- Checks received serial data for the framing and length that the firmware program of the application dictates through the processor module, and generates the framing of data characters to be transmitted. (The framing of a data character consists of: a start bit; the data character, which can be 5, 6, 7, or 8 data bits in length; the parity bit, if any; followed by 1 or 2 stop bits, or a possible 1.5 stop bit if a 5 data bit character length is being used.)
- Generates interrupts to the processor module, via the STIC module, when a firmware program (processor commanded) preselected interrupt condition occurs.



NOTE: THE SIGNAL CONNECTIONS LEADING FROM THE ASYNC I/F-2 MODULE TO THE MAINTENANCE PANEL ARE NOT SHOWN.

Figure 4-15. Async I/F-2 Functional Diagram

The transfer between the processor module and async I/F-2 module of a data character that is to be transmitted or that has been received, is via the bidirectional Data Bus lines during a shared bus communication transfer. The same is true for the transfer of status information from the async I/F-2 module to the processor module, and for the transfer of function commands from the processor module to the async I/F-2 module. Directions as to the type of information to be transferred in these cases is provided by the code placed on the Address Bus lines by the processor module.

+12-Volt and -12-Volt Regulators

The async I/F-2 module has two voltage regulators that provide regulated +12 V and -12 V ±5%. Input power is from the power supply assembly +20 V and -20 V unregulated outputs. Provided at the edge of the module are two LED indicators to indicate presence of the regulated voltages. The yellow LED indicates +12 V, and the green LED indicates -12 V.

Interface Characteristics

All signal interchange between the async I/F-2 module and the processor module, STIC module, and maintenance panel are TTL level signals with the majority of them being two-state (high or low). The signals within this group which are TTL three-state (high, low or floating), involve most of the shared bus interface signals that are with the processor module. The TTL two-state signals are defined as follows:

Inputs: 0.0 V to 0.8 V = logical 0
2.0 V to 5.0 V = logical 1

Outputs: 0.0 V to 0.4 V = logical 0
2.4 V to 5.0 V = logical 1

The TTL three-state signals have the following characteristics:

- Logical 1 = low impedance to +5 V.
- Logical 0 = low impedance to ground.
- Floating (indeterminate) = high impedance to both +5 V and ground.

All signal interchange between the two communications ports of the async I/F-2 module and the modem (internal or external) and the associated printer device, is at voltage levels which meet the requirements of RS-232-C. These signal levels are as follows:

Inputs: -25.0 V to +0.8 V = mark or inactive
+2.0 V to +25.0 V = space or active

Outputs: -12.0 V to 3.0 V = mark or inactive
+3.0 V to +12.0 V = space or active

DISPLAY/KEYBOARD I/F MODULE

This module, see figure 4-16, contains interface and control logic for the video monitor and the keyboard module.

Control Logic

The display/keyboard I/F module has two primary functions. In its operations with the keyboard module, it serves as an interim input data collector for the processor module. In its operations with the video monitor, it serves as an independent collector/video-generator of display refresh data in that it obtains the data that is to be displayed through performance of memory-read operations to the RAM, serializes the data, and converts the data to a video signal, all under its own control. Its keyboard circuitry provides an 8-bit parallel interface to the keyboard that generates an interrupt for each key depression. Depending upon the application, it also generates a status indication for each of the three positions (ON/OFF/MGT) of a keylock switch which may be located on the keyboard module. The video logic portion of the module contains 12 two-position rocker switches which select the following control and address functions for the display. To allow program control of their operations, two switches are bypassed.

- Display of 6 or 12 lines at 40 characters per line
- Display of 12 or 24 lines at 80 characters per line

  } Under program control; not switch-selectable

- Display operation at 50 or 60 Hz
- Display Enable switch to manually turn on the display for test purposes
- Eight address switches to establish the initial RAM address for display refresh

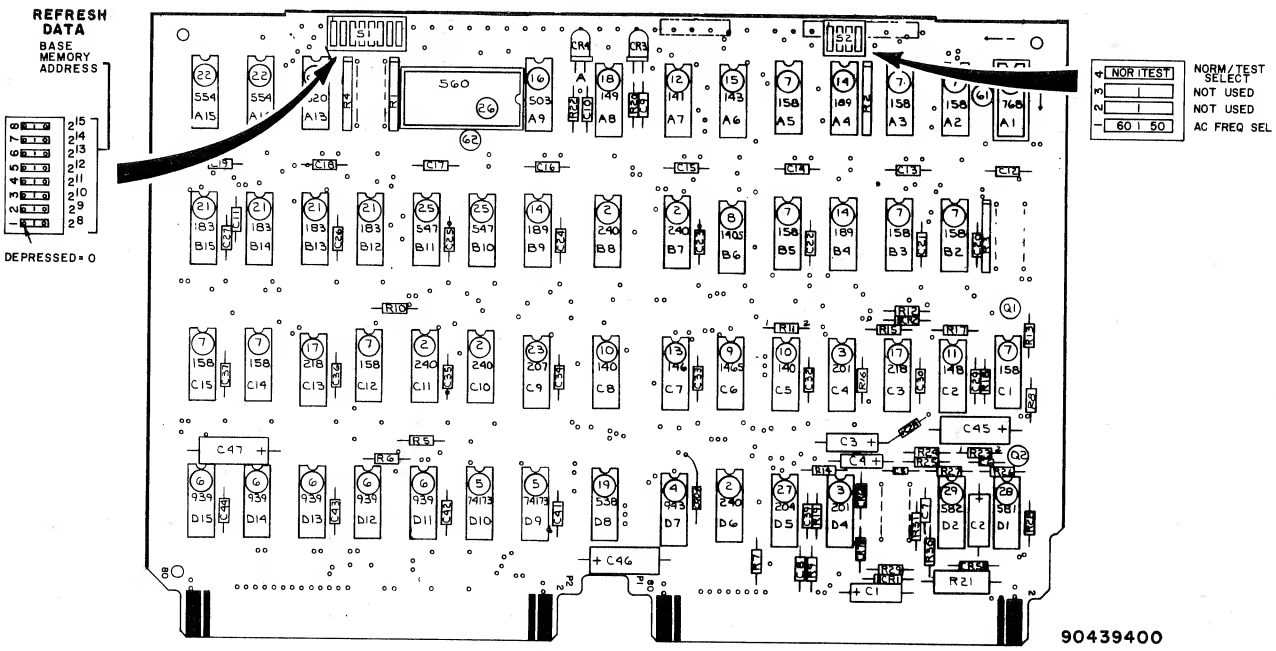


Figure 4-16. Display/Keyboard Interface Module

Information to be displayed is stored in the RAM by the processor module under program control. The initial memory block address is determined by the settings of the eight address switches which establish the upper 8 bits of the 16-bit memory Address Bus word. The lower 8 bits of the 16-bit Address Bus word which is controlled by the module's video control circuitry, reflect all zeros during the initial address. Each memory location within the memory block is uniquely related to a specific character position on the crt screen, with the initial address corresponding to the top left displayable portion of the screen. As the scanning cycle of the crt beam progresses from the initial position toward the right of the screen, the memory addresses that are generated for these positions by the module's video control circuitry increment accordingly. The actual relationship between the scanning of a display line and the reading from memory of its corresponding characters, is that the reading takes place one display line time before they are scanned. The incrementation of the lower 8 bits of the 16-bit Address Bus word continues until the last displayable character position on the screen has been reached in the current scanning cycle, at which time they are cleared to all zeros again in preparation for the next scanning cycle.

The 8-bit data character read from the addressed memory location is interpreted as either a displayable symbol or a video control code. Each video control code occupies one character position on the screen, but a blank is displayed in its place. Once a control code is detected in the data stream, the video option selected (blink, blank, inverse, or dim) becomes active until a new control code is detected or the end of the display line is reached, whichever occurs first. A blinking underline cursor may be program-generated by setting bit 2^7 in the character frame corresponding to the location on the screen where a cursor is to be displayed. There is no restriction as to how many cursors can be displayed simultaneously.

A character generator provides the dot-matrix pattern for each of the displayed characters and symbols. Video serializer and driver circuits convert the TTL signal level parallel data bits of each scan line into a serially-generated, noncomposite, video signal required by the video monitor. The horizontal and vertical sync pulses supplied to the video monitor by the module are via separate signal lines.

A phase lock loop circuit on the module is used to eliminate any "swim" effect on the screen caused by a difference between the ac power frequency and the internal refresh timing. It consists of a phase detector that compares two signals and generates an output which is a dc voltage proportional to the difference in phase between them. This voltage controls the frequency of a voltage-controlled oscillator. This frequency, divided by the correct number, is fed back to the phase detector to compare it with the ac input frequency. Upon power on, the circuit will start running at a certain frequency which will be varied by the phase detector output until they are in phase. Two indicators are provided at the board edge of the module which indicate the presence of +12-V dc and -12-V dc from the power supply (yellow indicates +12-V dc; green indicates -12-V dc).

Interface Characteristics

All signal interchange between the display/keyboard I/F module and the processor module is via the shared bus and an I/O channel assigned to the display/keyboard I/F module through the logic chassis backplane. The memory-read operations between the display/keyboard I/F module and RAM are also via the shared bus. The access to memory and to the shared bus during a memory-read operation is obtained from the processor module by the display/keyboard I/F module issuing a Bus Request signal on its I/O channel. If no shared-bus communication transfer is in process, the processor module responds to the request with a Bus Enable signal on the I/O channel which allows the memory-read operation to occur. All signal inputs from the keyboard module to the display/keyboard I/F module and from the display/keyboard to the video monitor, are via dedicated signal lines in the backplane. Nearly all of the shared-bus interface signals are TTL three-state (high, low, or floating), with the remaining shared-bus signals and all of the other interface signals, except that of the serial noncomposite video signal to the video monitor, being TTL two-state (high or low). The TTL two-state signals are defined as follows:

Inputs:	0.0 V to 0.8 V = logical 0
	2.0 V to 5.0 V = logical 1
Outputs:	0.0 V to 0.4 V = logical 0
	2.4 V to 5.0 V = logical 1

The TTL three-state signals have the following characteristics:

- Logical 1 = low impedance to +5 V
- Logical 0 = low impedance to ground
- Floating (indeterminate) = high impedance to both +5 V and ground

The amplitude of the serial noncomposite video signal to the video monitor from the display/keyboard I/F module has the following ranges:

- 1.0 to 2.0 V = white level
- 60 to 90% of white level = gray or dim level
- 0.3 to 0.7 V = black level

OPTIONAL INTERNAL MODEM MODULE OF THE CC617-B MODEL

There are three versions of an optional logic card modem module that can be used in the application of CC617-B. The card location in the logic chassis reserved for the modem module is card location 09. The two card connectors at this location provide all the interface connections that are required between the modem module and the communications telephone line fastened to the terminal block at the rear of the display terminal, port A of the async I/F-2 module, and power distribution system of the display terminal. There also are provisions for making individual pin connections between the modem module version part number 51912400 and a data coupler with a handset such as the Bell System CBS Data Coupler, via the top card connector. All of the interface connections and pin assignments pertaining to the modem module are shown in the interconnection diagrams contained in section 5.

All three versions of the modem module have similarities, in that all can operate in either point-to-point or multipoint communication arrangements, and each meets the requirements of EIA standard RS-232-C for asynchronous modems. Also, each version employs the phase-coherent frequency shift keying (FSK) type of modulation/demodulation. Other particulars concerning the three versions of the module are described in the following paragraphs.

Modem Module, CDC Part Number 51912400

This version is capable of handling a receive/transmit data transfer rate of from 0 to 1200 bits per second on switched-network communication lines or up to 1800 bits per second on leased communication lines. It can be configurated in either full-duplex 4-wire or half-duplex 2-wire fashion and has the capability of servicing a data coupler with a handset. The data coupler and handset may be part of either a Bell Systems CDT or CBS Data Access Arrangement. When a Bell CDT Data Coupler and a standard telephone handset with exclusion (data) key is employed, it provides the site of the display terminal with the capability of manual originating or answering. When a Bell CBS Data Coupler and a standard handset with exclusion (data) key is employed, it provides the site with not only manual originating and answering capabilities, but also automatic answering.

Major modulation/demodulation characteristics of the module are as follows:

- The analog receiving circuits recognize an incoming phone line signal with a power level of from -50 dBm (minimum) to 0 dBm (maximum with a frequency of either a mark or a space as being a carrier signal. A selection switch is provided on the module to decrease this minimum power level sensitivity from -50 dBm to -35 dBm.
- The FSK demodulation circuits consider the incoming phone line signal to be a mark (equivalent to logical 1) when its frequency is 1200 Hz nominal and a space (equivalent to logical 0) when its frequency is 2200 Hz nominal, with the center point between a mark and a space being at a frequency of 1700 Hz.

- The frequencies transmitted on an outgoing phone line signal by the FSK modulation circuits are:

  Mark (equivalent to logical 1), 1200 Hz
  Space (equivalent to logical 0), 2200 Hz
  Soft carrier — if enabled, 900 Hz
  Answer tone — if used with a Bell System CBS Data Coupler, 2012 to 2240 Hz

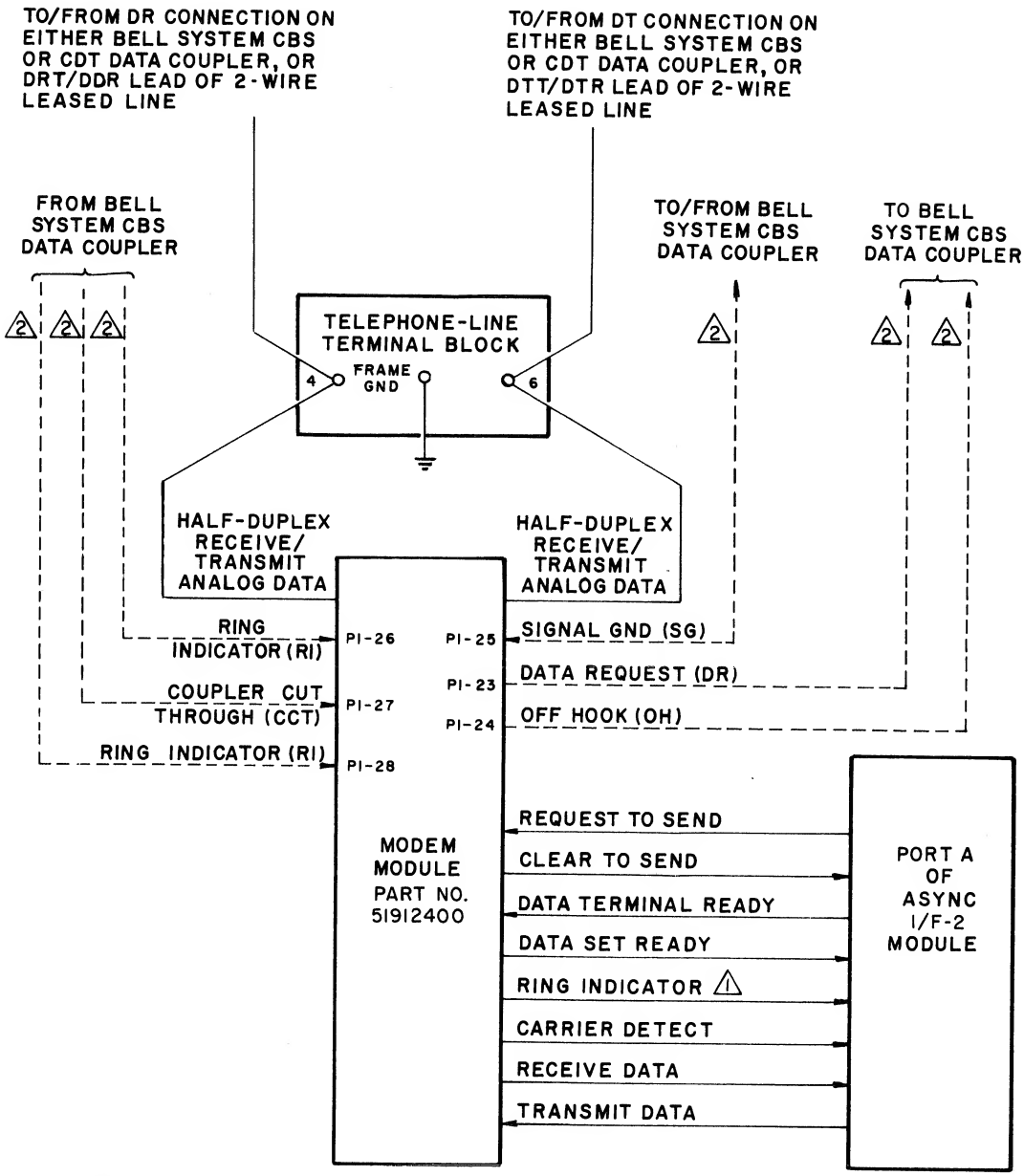
  To govern the transmission of the soft carrier, two selection switches are provided on the module. One switch enables/disables the transmission of a soft carrier; while the other selects the length of the time period in which, if enabled, the soft carrier is transmitted following the drop of the later discussed Request to Send signal from the async I/F-2 module, signifying the end of data transmission. The power level used by the module in the transmission of the mark, space, soft carrier, and answer tone frequencies is switch-selectable from 0 dBm (maximum) to -14 dBm (minimum), in decrements of 2 dBm. A mark or a space in the transmission represents a carrier signal.

- The analog receiving circuits employ an amplitude limiter type of equalization that is switch-selectable to match the basic distance in which communications are to occur.

Interface Signals and Definitions

The interface connections of the modem module in a half-duplex, 2-wire communication line configuration, along with its signal interface with the display terminal via the async I/F-2 module is shown in figure 4-17. This configuration would be used in a switched-network or 2-wire leased communication line application. As shown in the figure, the two wire connection made at the telephone-line terminal block, of the half-duplex transmit/receive analog data leads of the communication line, provide all the interface connections that are necessary for either of these methods of application. In the case of the switched-network application, these leads would be via a data coupler such as the Bell System CDT or CBS Data Coupler. If the latter data coupler is used in the application, the six additional interface connections shown in figure 4-17 as dashed-lines, would also be required to be made. The signal designations that are shown in the figure within parentheses are the abbreviated designations that actually appear on the interconnection panel of the coupler itself. In the case of a full-duplex, 4-wire leased communication line application, the connections made at the telephone-line terminal block would differ from those shown, and they would cause a separate set of receive and transmit analog data leads to be interconnected between the modem module and terminal block. The interface assignments of the terminal block for both 2-wire and 4-wire configurations are provided in a table contained in appendix A.

The definition of the telecommunication interface signals between the modem module and the communication line, via the interconnection paths provided by the telephone-line terminal block, is listed in table 4-1.



NOTES:

1. SIGNAL ONLY HAS SIGNIFICANCE WHEN A BELL SYSTEM CBS DATA COUPLER IS USED IN APPLICATION.

2. THESE LEADS WOULD HAVE TO BE TO THE MODEM MODULE VIA THE BACK OF THE TOP CARD CONNECTOR (PI) IN CARD LOCATION 09 OF LOGIC CHASSIS. THE PIN NUMBERING SCHEME OF THE CARD CONNECTORS IS SHOWN IN SECTION 5.

Figure 4-17. Interface Diagram of Modem Module Part Number 51912400 in 2-Wire Configuration

TABLE 4-1. MODEM MODULE/COMMUNICATION LINE SIGNAL DEFINITIONS

MODULE PIN NUMBER	SIGNAL	DEFINITION
P1-51/P1-52	Data Tip and Data Ring Transmit/ Receive — in half-duplex 2-wire configuration	These lines carry the half-duplex outgoing transmit analog data from the modem module and the half-duplex incoming receive analog data to the modem module.
P1-51/P1-52	Data Tip Transmit/Data Ring Transmit — in full-duplex 4-wire configuration	These lines carry the full-duplex outgoing transmit analog data from the modem module.
P1-54/P1-55	Data Tip Receive/Data Ring Receive	These lines carry the full-duplex incoming receive analog data to the modem module.

The definitions of the telecommunication interface signals that are used between the modem module and a Bell System CBS Data Coupler, which provide the site with automatic answering in a switched-network application, are listed in table 4-2.

TABLE 4-2. MODEM MODULE/BELL SYSTEM CBS DEFINITIONS

MODULE PIN NUMBER	SIGNALS	DEFINITION
P1-23/P1-24	Data Request/Off Hook	These two lines from the modem module are activated in conjunction to cause the receive/transmit analog data lines leading to the modem module to be connected through the coupler to the telephone line. This takes place whenever an automatic answer or data transmission on the telephone line is to occur. The Data Request/Off Hook signals are activated when the Data Terminal Ready signal from the async I/F-2 module is present and either the coupler has received a ring on the telephone line (Ring Indicator signal from coupler active) requiring that a subsequent automatic answer be made by the modem or a manual origination or answer has been completed by the indication of the Switch Hook signal from the coupler becoming inactive (until this occurs the operation is inhibited). The Data Request/Off Hook signals remain active in these circumstances until the Data Terminal Ready signal is dropped.
P1-25	Signal Ground	This line provides the common reference for all of the control interface signals between the modem module and coupler.
P1-26	Ring Indicator	The coupler activates this line when it receives a ring on the telephone line. Activation of the Data Request/Off Hook signals by the modem module inactivates it.
P1-27	Coupler Cut Through	The coupler activates this line to indicate to the modem module that its receive/transmit analog data lines are connected through the coupler to the telephone line. This follows the activation of the Data Request/Off Hook signals by the modem module.
P1-28	Switch Hook	The coupler activates this line when it senses a contact closure of whichever handset indicator is connected to it, which in this particular arrangement should be the exclusion key. Under these circumstances the contact closure of the exclusion key would occur either during a manual origination or manual answer so as to allow the telephone line to be transferred to the handset. Upon completion of the manual origination or answer, the control of the telephone line is transferred back to the modem module by the exclusion key being lifted, causing the Switch Hook signal to be inactivated. During the period in which the Switch Hook signal is active, the Data Request/Off Hook signals to the coupler are inhibited.

The signal interface between the modem module and the display terminal, by way of port A of the async I/F-2 module, is defined in table 4-3. As can be seen from the table, the significance of some of these signals differ with the communication type application in which the modem module is used. A visual indication of the state of these signal lines during operation is provided by eight red LEDs (one for each signal line) that are located on the outer board edge of the modem module. Each of the eight LEDs are labeled in an abbreviated fashion (such as, DTR for Data Terminal Ready) as to the signal line it represents. When an LED is lit, it indicates that the corresponding signal line is active. In regard to the Receive Data (RD) and Transmit Data (TD) LEDs, this means when they are lit (intermittently), that the corresponding signal line is not in an idle marking state and that data is being carried on it. Also contained on the outer board edge of the modem module are two LEDs which indicate the presence of +12 V and -12 V from the power supply assembly. The green LED glows when +12 V is present and the yellow LED glows when -12 V is present.

Switch-Selectable Strapping Options

In order to meet the requirements of all the communication line applications in which modem module part number 51912400 may be used, a total of thirteen switch-selectable strapping options are incorporated in the module as listed in table 4-4. The selection of the strapping options is governed by the setting of 21 two-position slide or rocker switches that are located on the component side of the module. To avoid inadvertent movement of the setting of these switches during handling once they have been set, each switch or group of switches has a slide-off cover installed over them. As can be seen from table 4-4, each of the switches is labeled as to what option its setting affects. During installation of the host display terminal, the modem module must be removed from the logic chassis and the covers removed to gain access to the switches so they can be set appropriately for the particular application in which the modem module is to be used. To facilitate this, the selection subcolumns of table 4-4, specify the option selection appropriate for each type of application when no particular circumstances have to be taken into consideration. When particular circumstances pertaining to an application do affect the selection of an option, the selection subcolumn for that application refers to the note contained in the table. In all cases, the pushing of a switch toward a labeled selection causes that option selection to be set or selected.

Not to be mistaken for any option selection switches are the three switches located along the outer board edge of the modem module that are labeled LOCAL LOOP BACK, REMOTE LOOP BACK, and MARK/SPACE TEST. These three switches are contained on the module for the purpose of performing tests on the module at a repair center facility. They are mentioned here because of their affect on the operation of the module if their normal operating settings should be inadvertently changed during the handling of the module or the shipment of the display terminal. Both the LOCAL LOOP BACK and REMOTE LOOP BACK switches must be set away from their corresponding labels and the 3-position MARK/SPACE TEST switch must be in its center position in order for normal operation to occur.

TABLE 4-3. MODEM MODULE/TERMINAL INTERFACE SIGNALS

SIGNAL	ORIGIN	ACTIVE STATE	HALF-DUPLEX/2-WIRE CONFIGURATION			FULL-DUPLEX/4-WIRE CONFIGURATION LEASED
			SWITCHED-NETWORK BELL CDT DATA COUPLER	SWITCHED-NETWORK BELL CBS DATA COUPLER	LEASED	
Request to Send	Async I/F-2	Spacing	Turns modem transmitter carrier on if Data Terminal Ready from async I/F-2 is active and Data Set Ready from modem is active. Carrier is turned off when Request to Send is inactivated.	Same	Same	Same
Clear to Send	Modem	Spacing	Indicates modem transmitter carrier is on and data may be transmitted.	Same	Same	Same
Data Terminal Ready	Async I/F-2	Spacing	Indicates the terminal is ready to receive or transmit data.	Same except in this case, it is an enabling condition that allows the modem to connect to the telephone line when an automatic answer, manual answer, or manual origination occurs.	Same as first description	Same as first description
Data Set Ready	Modem	Spacing	This response is given for Data Terminal Ready.	Same except in this case, it includes indication that the modem is connected to the telephone line.	Same as first description	Same as first description
Ring Indicator	Modem	Spacing	No significance always inactive.	Indicates that the coupler is receiving a ring on the telephone line.	No significance, always inactive	No significance, always inactive

TABLE 4-3. MODEM MODULE/TERMINAL INTERFACE SIGNALS (CONTD)

SIGNAL	ORIGIN	ACTIVE STATE	HALF-DUPLEX/2-WIRE CONFIGURATION			FULL-DUPLEX/4-WIRE CONFIGURATION LEASED
			SWITCHED-NETWORK BELL CDT DATA COUPLER	SWITCHED-NETWORK BELL CBS DATA COUPLER	LEASED	
Carrier Detect	Modem	Spacing	Indicates a carrier is being received on the telephone line by the modem or the modem itself is transmitting a carrier on the telephone line.	Same as first description	Same as first description	Indicates that a carrier is being received on the telephone line by the modem.
Receive Data	Modem	Logical 1 equivalent to a mark and logical 0 equivalent to a space	This signal line carries the demodulated data that the modem has received from the telephone line during receive operations. When the modem is not performing receive operations (Data Terminal Ready or Carrier Detect inactive) it holds the Receive Data line at a constant marking state.	Same	Same	Same
Transmit Data	Async I/F-2	Logical 1 equivalent to a mark and logical 0 equivalent to a space	This signal line carries the data that the modem is to modulate and transmit on the telephone line during transmit operations. When transmit operations are not being performed (Request to Send or Clear to Send inactive) the async I/F-2 holds the Transmit Data line in a constant marking state.	Same	Same	Same

TABLE 4-4. STRAPPING OPTIONS OF MODEM MODULE

STRAPPING OPTIONS	SELECTION SWITCHES	SELECTION					NOTES
		MODEM MODULE APPLICATION: FULL-DUPLEX, 4-WIRE, LEASED LINE: POINT-TO-POINT COMMUNICATION ARRANGEMENT	MODEM MODULE APPLICATION: FULL-DUPLEX, 4-WIRE, LEASED LINE: MULTIPOINT COMMUNICATION ARRANGEMENT	MODEM MODULE APPLICATION: HALF-DUPLEX, 2-WIRE, LEASED LINE	MODEM MODULE APPLICATION: SWITCHED-NETWORK COMMUNICATION LINE: AUTOMATIC ANSWERING	MODEM MODULE APPLICATION: SWITCHED-NETWORK COMMUNICATION LINE: MANUAL ANSWERING	
Transmit power level which is selectable from 0 dBm maximum to -14 dBm minimum in 2 dBm decrements	Three switches labeled XMT LEV -2, -4, -8. Pressing one of these switches toward its label selects that much of a decrease from the 0 dBm maximum (all three switches pressed away from their labels).	0 dBm	0 dBm	0 dBm	See note	See note	On switched-network applications, these switches are to be set so the power level selected is the same as the maximum transmit level marked on the data coupler. If this is not possible, then set the switches to the next lower 2 dBm decrement (such as, -5 dBm marked on data coupler: -5 dBm selection not possible so -4 and -2 switches are set toward their labels to select a -6 dBm transmit power level).
Half-duplex, 2-wire or full-duplex, 4-wire operation	One switch labeled 2W on one side and 4W on the other.	4W	4W	2W	2W	2W	
Automatic or manual answer	One switch labeled AUTO on one side and MAN on the other.	MAN	MAN	MAN	AUTO	MAN	
Receiving equalization that is selectable to match the basic distance communications that are to occur	Three switches labeled RCV EQ NEAR, NORM, and FAR.	See note	See note	See note	See note	See note	The selection made by these switches is to correspond to the distance in which communications are to occur as follows: NEAR selection for distances, if phoned would be a local call; or FAR selection for distances, if phoned would be a long-distance call; or NORM selection for cases where the distance of communications may be a combination of both.
Transmitter preemphasis	Two switches labeled XMT EQ IN, and XMT EQ OUT.	XMT EQ OUT	See note	XMT EQ OUT	XMT EQ OUT	XMT EQ OUT	The selection of these switches for 4-wire, leased, multipoint application depends upon the distance between the site and that of the higher processor. If this distance were phoned and had to be carried as a long-distance phone call, the XMT EQ IN switch would be set. If this is not the case, then the XMT EQ OUT switch would be set.
Carrier detect minimum power level which can be either -50 dBm or -35 dBm	One switch labeled CD LEV -50, CD LEV -35.	See note	See note	See note	See note	See note	The selection made by the setting of this switch depends upon the distance in which communications are to occur. Using the definitions given previously in this column for local and long-distance, set the switch as follows: for local communications, set the switch to -35; for long-distance communications, or a combination of both local and long-distance, set the switch to -50.

TABLE 4-4. STRAPPING OPTIONS OF MODEM MODULE (CONTD)

Receiver Termination	One switch labeled RCV TERM IN, RCV TERM OUT.	RCV TERM IN	See note	RCV TERM OUT	RCV TERM OUT	RCV TERM OUT	The selection of this switch for a 4-wire, leased, multipoint application depends on whether the site is at the end of the multipoint network or not. If the site is at the end of the network, the switch should be set to RCV TERM IN; otherwise it should be set to RCV TERM OUT.
Transmitter Termination	One switch labeled XMT TERM IN, XMT TERM OUT.	XMT TERM IN	See note	XMT TERM IN	XMT TERM IN	XMT TERM IN	The conditions for the selection of the setting of this corresponds to that given in this column for receiver termination.
Request to Send/Clear to Send delay which provides a selection of a 200, 60, or 10-millisecond delay period between RTS going active, and the issuance of CTS	Two interrelated switches labeled RTS/CTS 200/60, 10; and RTS/CTS 200, 60/10. Both switches have to be set in a related fashion in order to make a selection (such as, to select a 60-ms delay, the one switch has to be set to 200/60 and the other to 60/10).	See note	See note	See note	200/60 and 200	200/60 and 200	The selection made by the setting of these two switches for a leased line application depends upon what length delay period is used by other sites of the communication system and namely the higher-level processor. The selection made should then match or be as close as possible to that delay period.
Carrier detector-on delay which determines if the delay period between the actual detection of a carrier and the indication of its detection via Carrier Detect, is to be 40 or 6 milliseconds in length	One switch labeled CD ON, with 40 labeled on one side and 6 on the other.	See note	See note	See note	40	40	The condition for the selection of the setting of this switch corresponds to that given in this column for Request to Send/Clear to Send delay.
Carrier detector-off delay which determines if the delay period between the actual detection of the drop of a carrier and the indication of it doing so by dropping Carrier Detect, is to be 15 or 6 milliseconds in length	One switch labeled CD OFF, with 15 labeled on one side and 6 on the other.	See note	See note	See note	15	15	The conditions for the selection of the setting of this switch corresponds to that given in this column for Request to Send/Clear to Send delay.
Transmit soft carrier selection which either enables or disables it from being transmitted, and if enabled, determines the length of the time period it is transmitted following the drop of RTS	Two switches labeled SC ON/OFF; and 25, 10, with the numbers 25 and 10 representing milliseconds.	SC OFF	See note	SC ON and 10	SC ON and 25	SC ON and 25	The selection of these switches for a 4-wire, leased, multipoint application depends if actual communications are to be 2-way alternate or full-duplex. If they are to be full-duplex, the switch labeled SC ON/OFF should be set to OFF. If they are to be 2-way alternate, the switch labeled SC ON/OFF should be set to ON, and the conditions for the selection of the setting of the other switch corresponds to that given in this column for Request to Send/Clear to Send delay.
Receiver squelch selection that either enables or disables it from being employed, and if enabled, determines the length of the period it is employed following the drop of RTS	Two switches labeled SQ ON/OFF; and 145, 40, with the numbers 145 and 40 representing milliseconds.	SQ OFF	SQ OFF	SQ ON and 40	SQ ON and 145	SQ ON and 145	

Interface Characteristics

Except for the incoming/outgoing analog phone line signals from/to the communication line, which characteristics have been previously defined, all signal interchange involving the modem module is at the following signal levels:

Inputs: -25.0 V to +0.8 V = mark or inactive
+2.0 V to +25.0 V = space or active

Outputs: -12.0 V to -3.0 V = mark or inactive
+3.0 V to +12.0 V = space or active

Modem Modules, CDC Part Numbers 51912402 and 51912403

Both of these versions have a receive/transmit data transfer rate of from 0 to 1200 bits per second on leased communication lines configured in full-duplex, 4-wire fashion. The only difference between these two versions is that part number 51912403 can provide its own regulation of power voltage and part number 51912402 cannot provide regulation. However, since the self-power regulation feature of part number 51912403 is not used in its employment in the CC617-B Display Terminal, the two versions, in this case, are considered identical operationally. A block diagram depicting the modulation/demodulation circuits of both versions is shown in figure 4-18.

Receive and Transmit Operation

The directional flow of an incoming signal on the receive analog data leads of the phone line through the demodulation circuitry is shown in figure 4-18 by arrows. In order for an incoming signal to be accepted by the receive filter through the receiver isolation transformer, it must have a power level of from -32 dBm (minimum) to 0 dBm (maximum) and be within the frequency range of 1050 to 2350 Hz. This 1050 to 2350 Hz frequency range represents the low-frequency limit of a mark and the high-frequency limit of a space. If the incoming signal meets these requirements, it is passed on through a limiter to an FSK data detector, and depending on whether this is the initial detection of a carrier, the carrier detection circuit either waits to activate or retains activation of the Carrier Detect signal to the async I/F-2 module. If this is the initial detection of a carrier, a fixed 40-millisecond delay within the carrier detect circuit must timeout before the circuit activates the Carrier Detect signal. This delay is incorporated to insure that the carrier supposedly detected, is in fact a true carrier and not just noise on the communication line. If the carrier is still being detected when the 40-millisecond delay times out, the carrier detect circuit activates the Carrier Detect signal to initiate a receive operation by the display terminal. Until activation of the Carrier Detect signal, flow of the incoming signal through the FSK data detector and the filter circuit that follows it, is insignificant because the resultant content of the signal is disabled from being transferred to the async I/F-2 module on the Receive Data signal line.

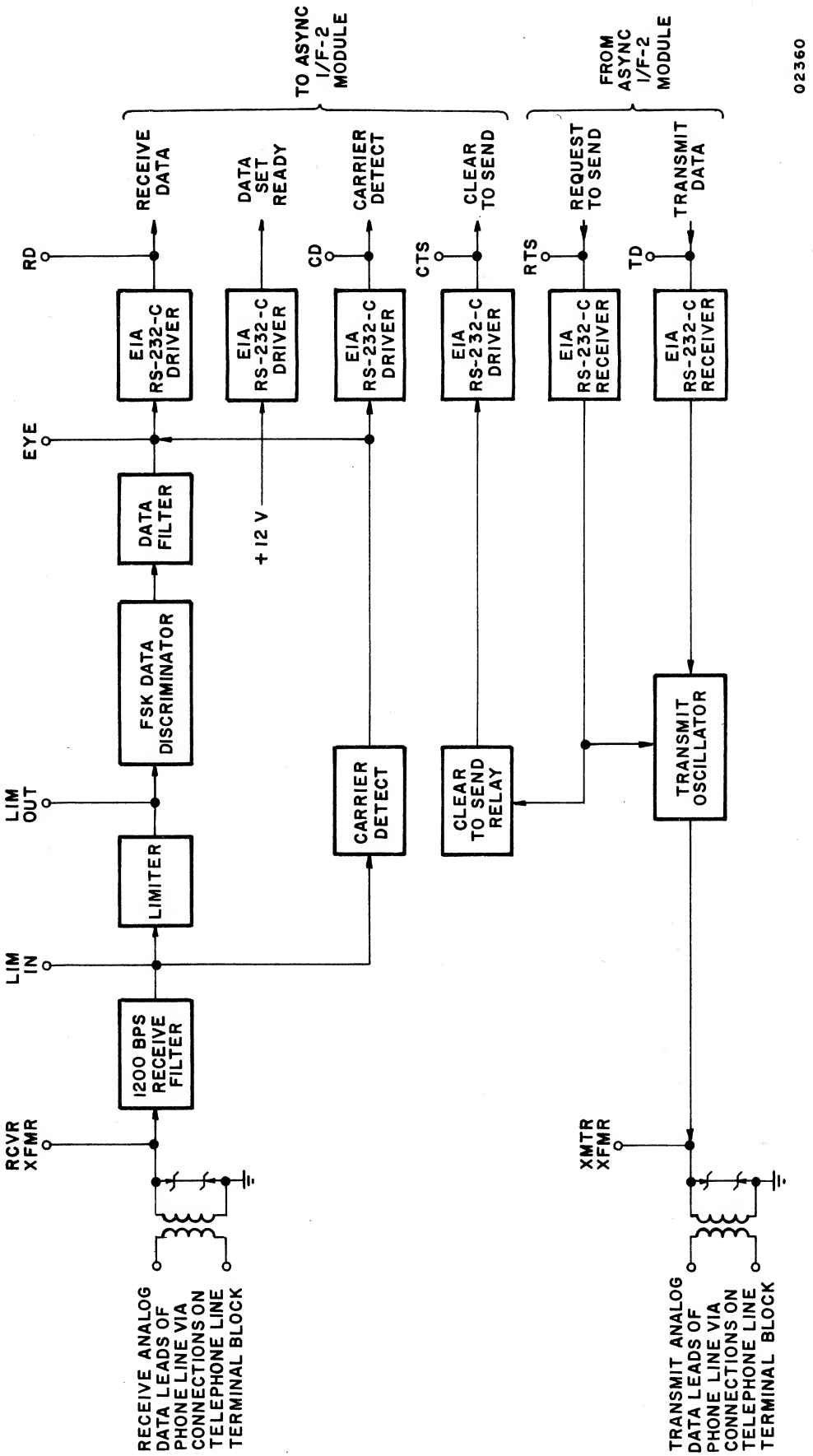


Figure 4-18. Block Diagram of Modem Module Part Numbers 51912402/51912403

With the Carrier Detector signal active, the output from the FSK data detector through the filter circuit which represents the content of the incoming signal, is enabled to be placed on the Receive Data signal line. The FSK data detector is a frequency discriminating circuit that recognizes 1700 Hz as being the crossover point between the nominal frequency of a mark, which is 1200 Hz, and the nominal frequency of a space, which is 2200 Hz. The flow of the content of the incoming signal continues on the Receive Data line until a drop of the carrier is detected by the carrier detect circuit. When this occurs, a fixed 10-millisecond delay within the carrier detect circuit begins a time-out. During this 10-millisecond period, the Carrier Detect signal is kept active while the Receive Data line goes to an inactive marking state, which provides the display terminal with a clean termination of the received message.

The output of the modulation circuitry, which is connected to the transmit analog-data leads of the phone line via the transmitter isolation transformer, is controlled by the state of the Request to Send signal from the async I/F-2 module. To initiate a transmit operation, the display terminal activates the Request to Send signal, which enables the output of the modulation circuitry to be transmitted on the phone line. At this point, the response to the Request to Send of Clear to Send by the modem module, is not issued until a fixed 60-millisecond delay times out. During this period the Transmit Data line from the async I/F-2 module, which is the input to the modulation circuitry, is in an inactive marking state and these successive marks are what is modulated and transmitted as a carrier signal to prelude the transmission of actual data.

Once the 60-millisecond delay times out, the Clear to Send signal to the async I/F-2 module is activated by the modem module which allows the display terminal to place on the Transmit Data line the actual data to be modulated and transmitted. The FSK modulation of the content of the Transmit Data line is performed by the transmit oscillator circuit. The frequencies generated by the transmit oscillator is 1200 Hz for a mark and 2200 Hz for a space. These signals are transmitted at the power level of 0 dBm. The disabling of the transmit oscillator output occurs when the Request to Send signal is inactivated by the display terminal to end the transmit operation, and in response, the modem module inactivates the Clear to Send signal.

The significance, of the interface signals shown in figure 4-18 between the modem and async I/F-2 modules, is stated in table 4-5.

NOTE

In the case of both modem versions, the Data Terminal Ready signal orginating from the async I/F-2 module does not interconnect with any of their circuitry and does not have any effect on their operation.

TABLE 4-5. MODEM MODULE/ASYNC I/F-2 SIGNAL DEFINITIONS

SIGNAL	DEFINITION	ACTIVE STATE
Request to Send	This signal turns the modem transmitter carrier on.	Spacing
Clear to Send	Indicates modem transmitter carrier is on and that data may be transmitted.	Spacing
Data Set Ready	This signal is continuously active.	Spacing
Carrier Detect	Indicates that a carrier is being received on the phone line by the modem.	Spacing
Receive Data	This signal line carries the demodulated data that the modem has received from the phone line when a carrier is being received. When a carrier is not being received, the modem keeps this signal line at a constant marking state.	Logical 1 equivalent to a mark and logical 0 equivalent to a space
Transmit Data	This signal line carries the data that the modem is to modulate and transmit on the phone line when the Request to Send signal is active. When the Request to Send signal is inactive, the async I/F-2 module keeps this signal line at a constant marking state.	Logical 1 equivalent to a mark and logical 0 equivalent to a space

There are no strapping options on either of these two modem module versions. Only two LED indicators are contained on them and are located along the outer board edge. When lit, these LEDs indicate that +12 V and -12 V are being received from the power supply assembly. The green LED shows the presence of +12 V and the yellow LED shows the presence of -12 V.

Interface Characteristics

Except for the incoming/outgoing analog phone line signals from/to the communication line, which characteristics have been previously described, all signal interchange of both modem module versions is with that of port A of the async I/F-2 module at the following signal levels:

Inputs: -25.0 V to +0.8 V = mark or inactive
+2.0 V to +25.0 V = space or active

Outputs: -12.0 V to -3.0 V = mark or inactive
+3.0 V to +12.0 V = space or active

POWER SUPPLY ASSEMBLY

The primary supplier of the low voltages used in the display terminal is the power supply assembly. Voltages produced by the assembly include regulated -5-V dc, -12-V dc, +12-V dc, and unregulated -20-V dc, +20-V dc, and 20-V ac. One of the major recipients of the power supply output is the +5-V regulator card(s) housed in the logic chassis. As has been discussed earlier in this section, the +5-V regulator(s) have the task of providing +5-V dc to the other modules contained in the logic chassis. Between the power supply assembly and +5-V regulator(s), all the basic low-voltage requirements of the display terminal are fulfilled. The major components that comprise the power supply assembly, along with the ac entry panel associated with the power supply, are shown in figure 4-19 and discussed in the following paragraphs.

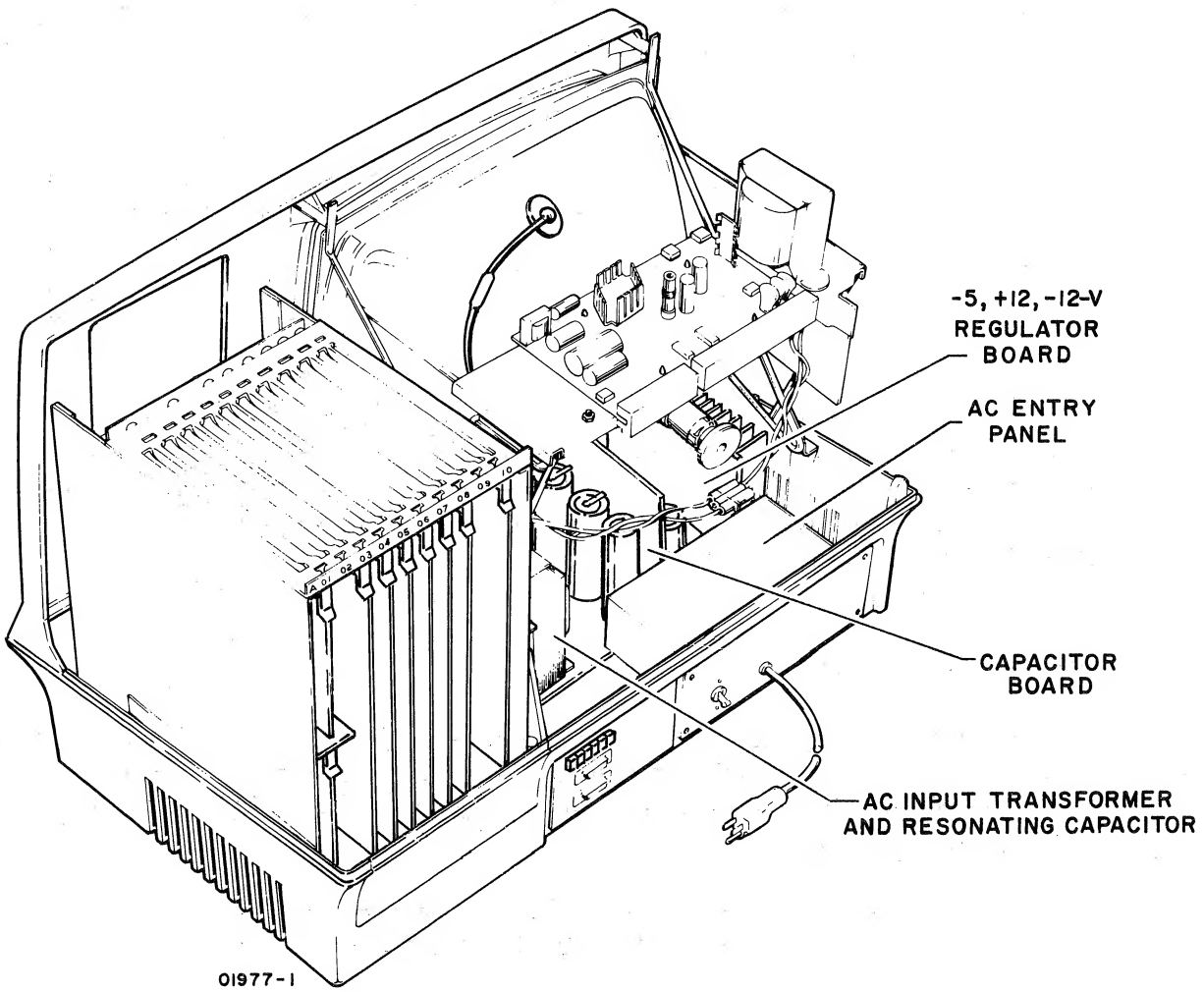


Figure 4-19. Power Supply Components

CAPACITOR BOARD

The capacitor board provides filtering for the rectified +20 and -20 voltages from the rectifier assembly. It distributes these voltages to the +15-V dc regulator on the crt monitor and to the +12, -12 regulator of the power supply assembly.

-5, +12, -12-V DC REGULATOR BOARD

This board provides regulated -5, +12, and -12-V dc and distributes the unregulated +12 V, -20 V to the logic chassis. Four test points are provided on this board for the +12, -12, and -5-V dc voltages and ground. The -5-V dc output is not used in the present configuration of CC617-A.

AC INPUT TRANSFORMER AND RESONATING CAPACITOR

The ac input transformer receives ac input voltage from the ac entry panel on its primary windings and provides stepped-down ac voltages to the rectifier and capacitor board. The transformer is a ferro-resonant type which has an associated resonating capacitor. The resonating capacitor is field-replaceable.

AC ENTRY PANEL

The ac entry panel contains the primary circuit breaker and the ac entry power cord. It provides the primary ac input voltage to the ac entry transformer. It is field-replaceable.

RECTIFIER

The nominal 20-volt ac secondary windings of the ac entry transformer are rectified to a pulsating dc voltage by the rectifier assembly. It is a silicon full-wave bridge rectifier that provides the +20 and -20-V dc input to the capacitor board for subsequent filtering.

MAINTENANCE PANEL

The maintenance panel, figure 4-20, contains a single PC board with:

- Sixteen LED indicators with their corresponding drivers
- Eight toggle switches
- Two momentary switches

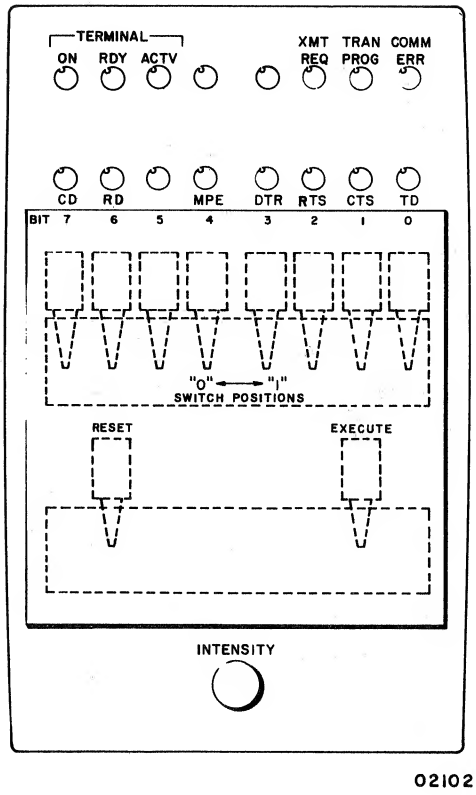


Figure 4-20. Maintenance Panel

All input signals used to control the LED indicators are TTL compatible. A logical 1 at the input of an LED driver turns the indicator on. A logical 0 at the input of an LED driver turns the indicator off. An open input is interpreted as a logical 1 light-emitting state.

The output signals of the maintenance panel are connected to the 10 switches that are accessible by removing the snap-on cover from the panel. Switches 0 through 7 are single-pole, double-throw, break-before-make type. In the Right position, their outputs are open, which represents a logical 1 state. In the Left position, their outputs are connected to Common, which represents a logical 0 state. The EXECUTE switch is a momentary, single-pole, double-throw, break-before-make switch. In the Left position (at rest), the NC contact is connected to Common and the NO contact is open. In the Right position, the NC contact is open and the NO contact is connected to Common. The RESET switch is identical to the EXECUTE switch, the only difference being that the NC contact is not used.

Eight indicators (upper row) reflect different terminal conditions, depending on whether the terminal is in a normal operating mode or in a diagnostic mode. For normal operating mode, six of the indicators are used to reflect the following program status conditions under program control.

- ON —
- RDY — } Program execution started
- ACTV — Active
- XMT REQ — Transmit request
- TRAN PROG — Transaction in progress
- COMM ERR — Communications error

In the diagnostic mode, the information that these eight indicators reflect is not as basic in nature as when in normal operating mode, and because the indicators are under program control, this information is likely to differ between different applications of the display terminal. In the diagnostic mode of the Ticketron application of the display terminal, these indicators reflect which quicklook is in execution according to the following:

- 0000 0001 — Test 001 (ROM checksum test)
- 0000 0010 — Test 002 (RAM memory test)
- 0000 0011 — Test 003 (Command test)
- 0000 0100 — Test 004 (Async comm channel test)
- 1111 1111 — Test 005 (Display test)
- 0000 0000 — Test 006 (Keyboard test)
- 0000 0111 — Test 007 (Ticket printer test)
- 0000 1000 — Test 010 (Matrix printer test)

Eight indicators (lower row) reflect the following communication interface status conditions. One indicator is not labeled and is controlled by the 2^7 output of the STIC module auxiliary register.

- CD — Carrier Detect
- RD — Receive Data
- MPE — Memory Parity Error
- DTR — Data Terminal Ready
- RTS — Request To Send
- CTS — Clear To Send
- TD — Transmit Data

The functions, that the ten maintenance panel switches control, depend upon the firmware program employed in the application. In the Ticketron application of the display terminal, the eight switches (0 through 7) and the RESET switch provide manual controls for the diagnostic/autoload execution as follows:

- RESET switch — toggling this switch causes the quicklook-autoload sequence determined by the settings of the eight switches (0 through 7) to be reinitiated.
- Switches 7 through 0 = 0 — execute quicklook and autoload
- Switch 7 = 1 and switches 6 through 0 = 0 — bypass quicklook
- Switch 7 and 6 = 1 and switches 5 through 0 = 0 — bypass quicklook and autoload
- Switch 5 = 1 and switches 4 through 0 = 0 (switches 7 and 6 as desired) — program pause
- Switches 3, 2, 1, or 0 = 1 — quicklook only (selectable tests)

In the Ticketron application, the function of the other maintenance panel switch is:

- EXECUTE switch — toggling this switch following a transmission or checksum error causes a reload of a program page of the applications program to occur.

KEYBOARD MODULE OF THE CC617-A MODEL AND TICKETRON APPLICATION OF CC617-B

The keyboard module, figure 4-21, contains an 86-key keyboard assembly and a three-position keylock switch. A unique 8-bit binary code is assigned for each of the 86 keys. Each key, when pressed, presents its assigned code and a Data Ready signal in parallel to the display/keyboard I/F module located in the logic chassis. All voltages and control signals necessary for keyboard operation are provided from the display terminal via a 2-foot interconnecting cable between the keyboard module and the keyboard I/O connector of the terminal. Signals present on this cable are typically less than 30 V dc and greater than -13 V dc.

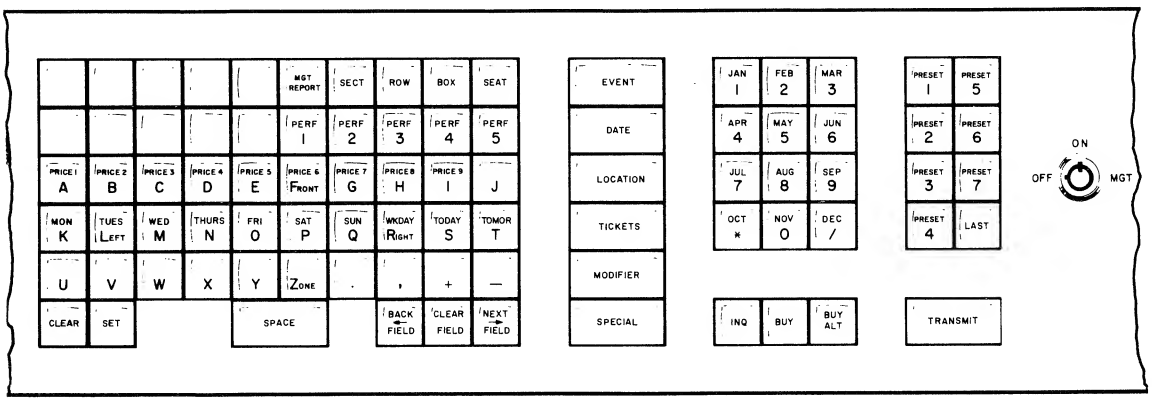


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Figure 4-21. Keyboard Module

The three-position OFF/ON/MGT keylock switch requires a key for operation and may be removed in either the OFF or ON position. Status codes are generated for each key position. When placed in the OFF position, the keylock switch disables the ac input power to the ticket printer. The ON and MGT positions apply power to the ticket printer and permit normal keyboard operation for ticket sales data input or management data input under software control.

The status bits provided to the keyboard interface logic for the different positions of the keylock switch are as follows:

Switch Position	Status Bits 2^3	2^2	Switch Contact
OFF	0	0	Open
ON	0	1	Closed
MGT	1	1	Closed

The switch contact controls the application of power to the ticket printer controller cabinet.

This section contains the module interconnection and cabling diagrams for the display terminal. These diagrams are divided in two sets; on the first set, drawing number 62200815, applies to CC617-A and the second set, drawing number 62200826, applies to CC617-B. Logic diagrams for the various modules are contained in the respective hardware maintenance manual for that assembly. Refer to the preface of this manual for applicable publication numbers.

The pin numbering scheme of the modules within the logic chassis is shown in figure 5-1.

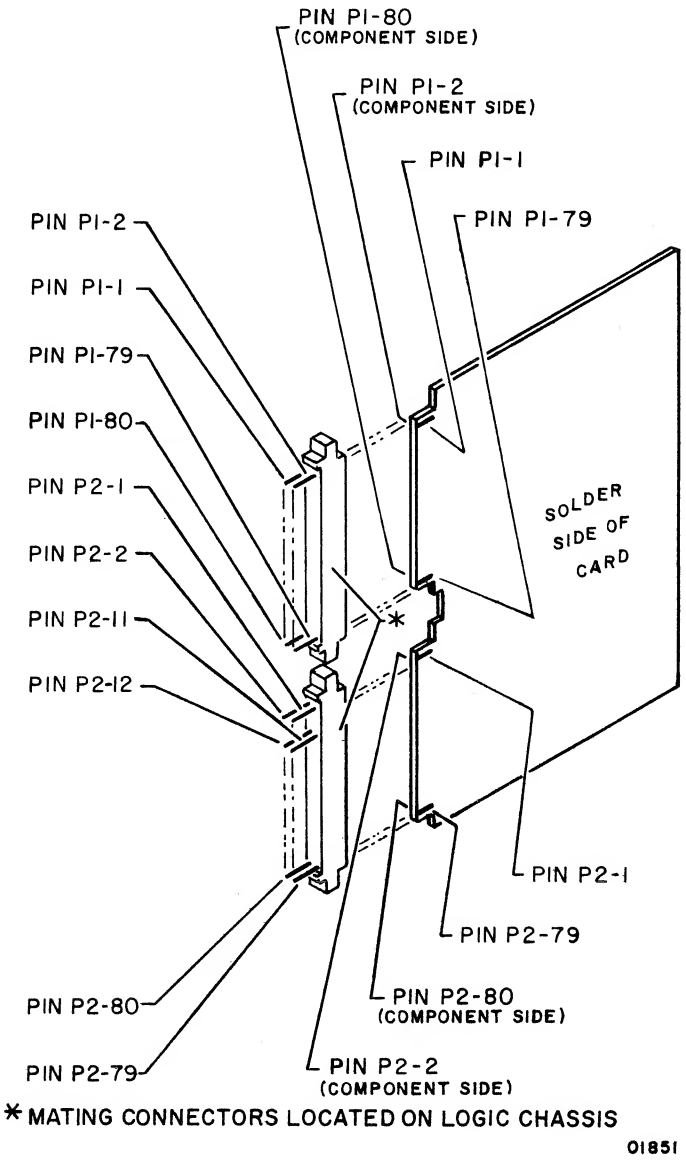


Figure 5-1. Pin Numbering Scheme of Modules in Logic Chassis

DIAGRAMS APPLICABLE TO CC617-A

SHEET NO.	CROSS REFERENCE NUMBER	REV	LOGIC DIAGRAM TITLE
1		B	MODULE INTERCONNECTION DIAGRAM CONTROL SHEET
2		A	BUSSED SIGNAL CHART
3	A01	A	+5V REGULATOR (SLAVE)
4	B01	A	+5V REGULATOR (MASTER)
5	02	A	MAINT PANEL I/F CONNECTOR
6	03	A	ROM MEMORY MODULE
7	04	A	RAM MEMORY (1000-1FFF)
8	05	A	RAM MEMORY (0000-0FFF)
9	06	A	PROCESSOR
10	07	A	STIC
11	08	A	ASYNC I/F-2
12	09	A	MODEM MODULE (OPTION)
13	10	A	DISPLAY/KYBD I/F MODULE
14	11	A	CABLE WIRING DIAGRAM
15	12	B	CABLE WIRING DIAGRAM
16	13	A	CABLE WIRING DIAGRAM
17	14	A	CABLE WIRING DIAGRAM

SHEET REVISION STATUS	REVISION RECORD						
	REV	CO	DESCRIPTION	DRFT	DATE	CHKD	APP
	A	10842-40	RELEASED CLASS A	E.E.	3/12/76	EE	M.T
	B	CD11623	REVISED SHTS 1&15 PER ECO	J M	7-21-76	WW	JEH

SHEET NO.	CROSS REFERENCE NUMBER	REV	LOGIC DIAGRAM TITLE

NOTES

FOR LOGIC CHIP INFORMATION SEE DRAWING (82297000) KEY TO SYMBOLS.

REFERENCE DRAWING

COMPONENTS EXCEPT AS NOTED	TOLERANCE	VALUE	RATING
RES			
CAP			

CONTROL DATA		
FIRST USED ON	CC617A	
DWN	E. ERSFELD	1-29-76
CHKD	Earl Ersfeld	3/12/76
ENGR	J.R. Hamacher	3/12/76
MFG	T. Trimmer	3-18-76
APPR	J.R. Hamacher	3-18-76

TITLE

MODULE INTERCONNECTION DIAGRAM CONTROL SHEET

CODE IDENT		DRAWING NO
15920	C	62200815

SCALE	CROSS REF NO	SHEET 1 OF 17

MODULE NAME AND LOCATION

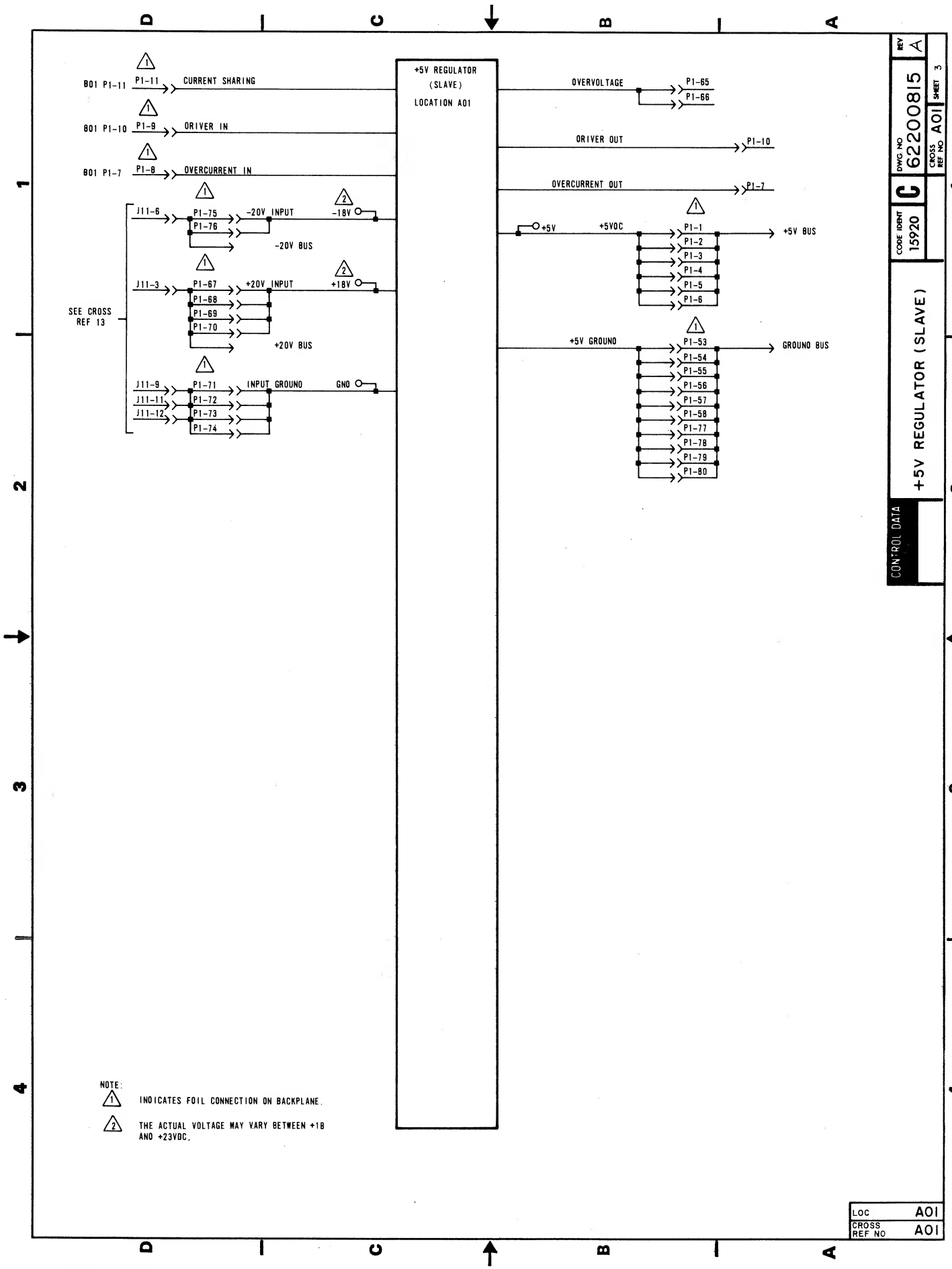
BUSSED SIGNAL NAME AND PIN NUMBER		02 MAINT PANEL I/F CONNECTOR	03 MEMORY (ROM) (F000-FFFF)	04 MEMORY (RAM) (0000-0FFF)	05 MEMORY (RAM) (1000-1FFF)	06 PROCESSOR	07 STIC	08 ASYNC I/F-2	09 MODEM	10 DISPLAY/KYBD I/F MODULE
+5V	P1-1,2,3,4 P2-1,2,3,4	X	X	X	X	X	X	X	X	X
GND	P1-77,78,79,80 P2-77,78,79,80	X	X	X	X	X	X	X	X	X
+20V	P1-71,72 P2-71,72					X		X	X	
-20V	P1-75,76 P2-75,76		X			X		X	X	
-PROCESSOR ON BUS	P2-8					X				
-INTA	P2-9					X				
-CONTROL PANEL STROBE	P2-10					X				
-HLDA	P2-11					X				
-SYNC	P2-12					X				
-STEP	P2-13					X				
-HOLD	P2-14					X				
-ENABLE CONTROL PANEL STROBE	P2-15					X				
-FETCH	P2-16					X				
-MT5	P2-17					X				
-MT4	P2-20					X				
-MT3	P2-18					X				X
-MT2	P2-19					X				
-MT1	P2-21					X	X			
+2 MHZ	P2-22					X	X	X		
-ANTICIPATE READY	P2-37		X	X	X	X	X	X		
-MASTER RESET TO PROCESSOR	P2-38					X	X			
-READY	P2-39		X	X	X	X	X			X
+10 MHZ	P2-40		X	X	X	X				
-MEMORY REQUEST	P2-41		X	X	X	X	X			X
-I/O STROBE	P2-42					X				
-WRITE	P2-43		X	X	X	X	X	X		X
-MASTER RESET FROM PROC	P2-44		X			X	X	X		X
+ADDRESS BUS 2^{15}	P2-45		X	X	X	X	X			X
+ADDRESS BUS 2^{14}	P2-46		X	X	X	X	X			X
+ADDRESS BUS 2^{13}	P2-47		X	X	X	X	X			X
+ADDRESS BUS 2^{12}	P2-48		X	X	X	X	X			X
+ADDRESS BUS 2^{11}	P2-49		X	X	X	X				X
+ADDRESS BUS 2^{10}	P2-50		X	X	X	X				X
+ADDRESS BUS 2^{9}	P2-51		X	X	X	X				X
+ADDRESS BUS 2^{8}	P2-52		X	X	X	X				X
+ADDRESS BUS 2^{7}	P2-53		X	X	X	X				X
+ADDRESS BUS 2^{6}	P2-54		X	X	X	X				X
+ADDRESS BUS 2^{5}	P2-55		X	X	X	X				X
+ADDRESS BUS 2^{4}	P2-56		X	X	X	X	X			X
+ADDRESS BUS 2^{3}	P2-57		X	X	X	X				X
+ADDRESS BUS 2^{2}	P2-58		X	X	X	X	X	X		X
+ADDRESS BUS 2^{1}	P2-59		X	X	X	X	X	X		X
+ADDRESS BUS 2^{0}	P2-60		X	X	X	X	X	X		X
+DATA BUS 2^{7}	P2-61		X	X	X	X	X	X		X
+DATA BUS 2^{6}	P2-62		X	X	X	X	X	X		X
+DATA BUS 2^{5}	P2-63		X	X	X	X	X	X		X
+DATA BUS 2^{4}	P2-64		X	X	X	X	X	X		X
+DATA BUS 2^{3}	P2-65		X	X	X	X	X	X		X
+DATA BUS 2^{2}	P2-66		X	X	X	X	X	X		X
+DATA BUS 2^{1}	P2-67		X	X	X	X	X	X		X
+DATA BUS 2^{0}	P2-68		X	X	X	X	X	X		X

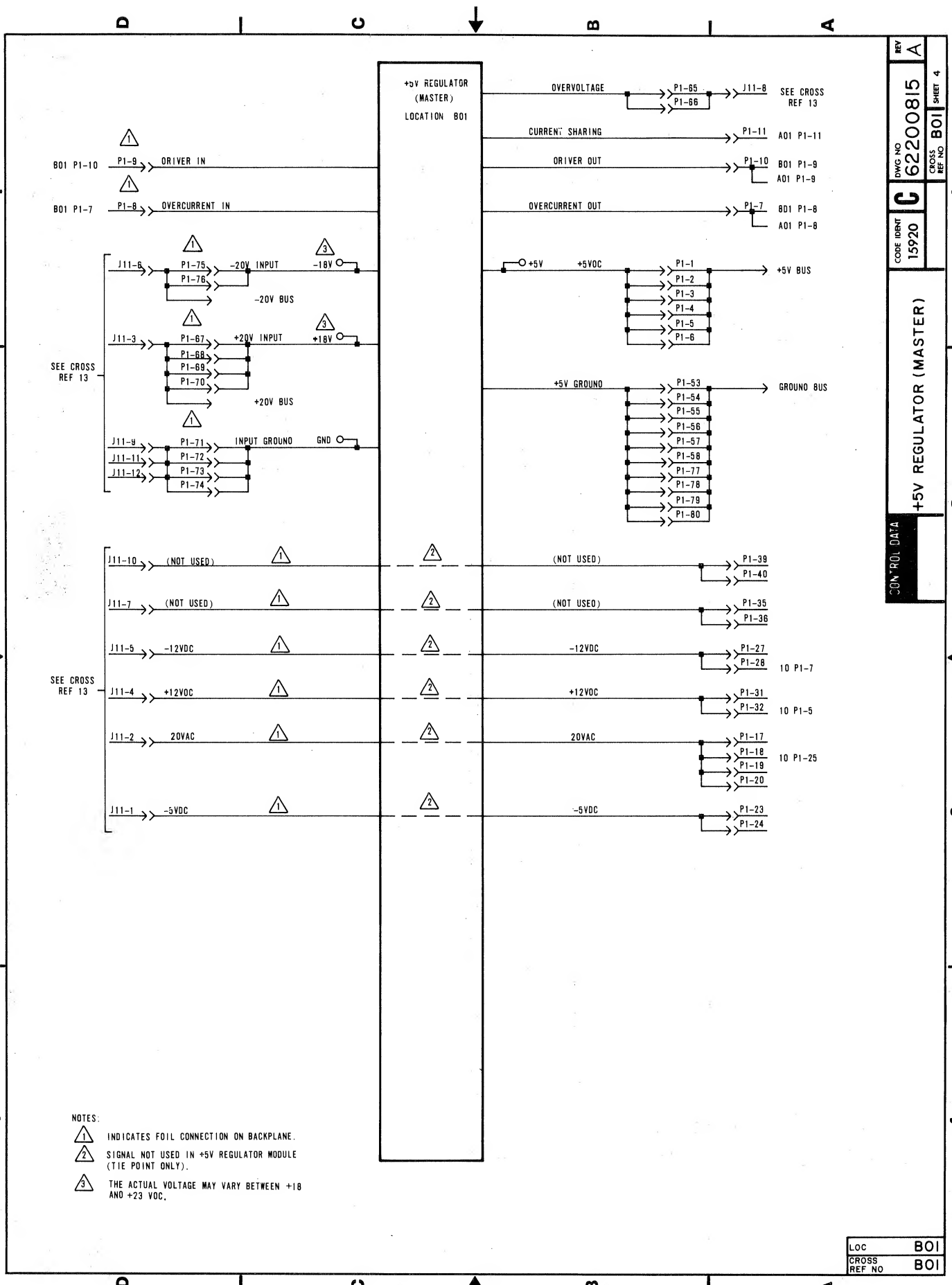
NOTE: THESE SIGNALS ARE PRESENT ON LOCATIONS 02 THROUGH 10
THE X INDICATES WHERE THE SIGNALS ARE ACTUALLY USED.

BUSSED SIGNAL CHART

CODE IDENT 15920 | C | DWG NO 62200815 | REV A | SHEET 2 | CROSS REF NO

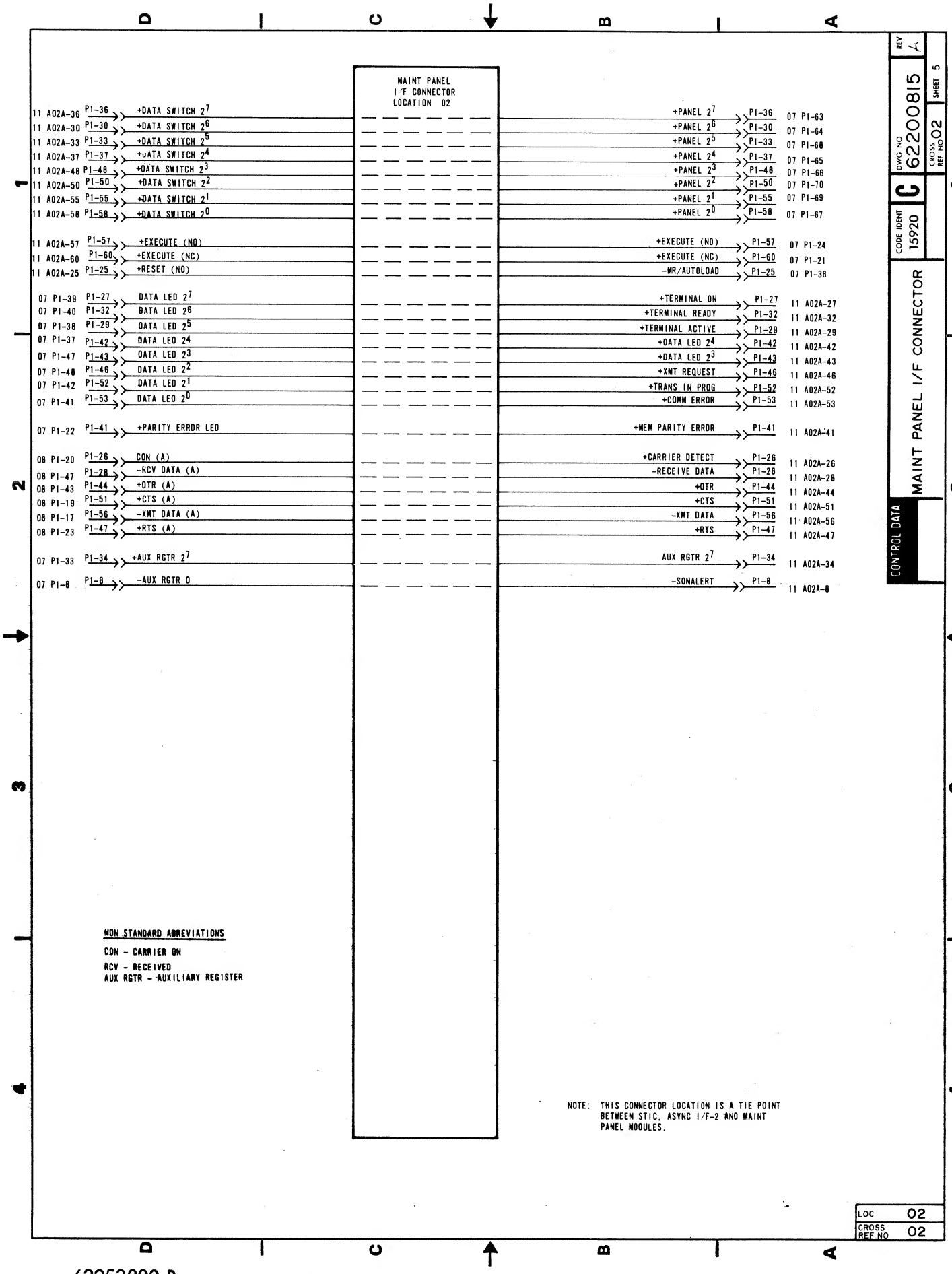
CROSS REF NO

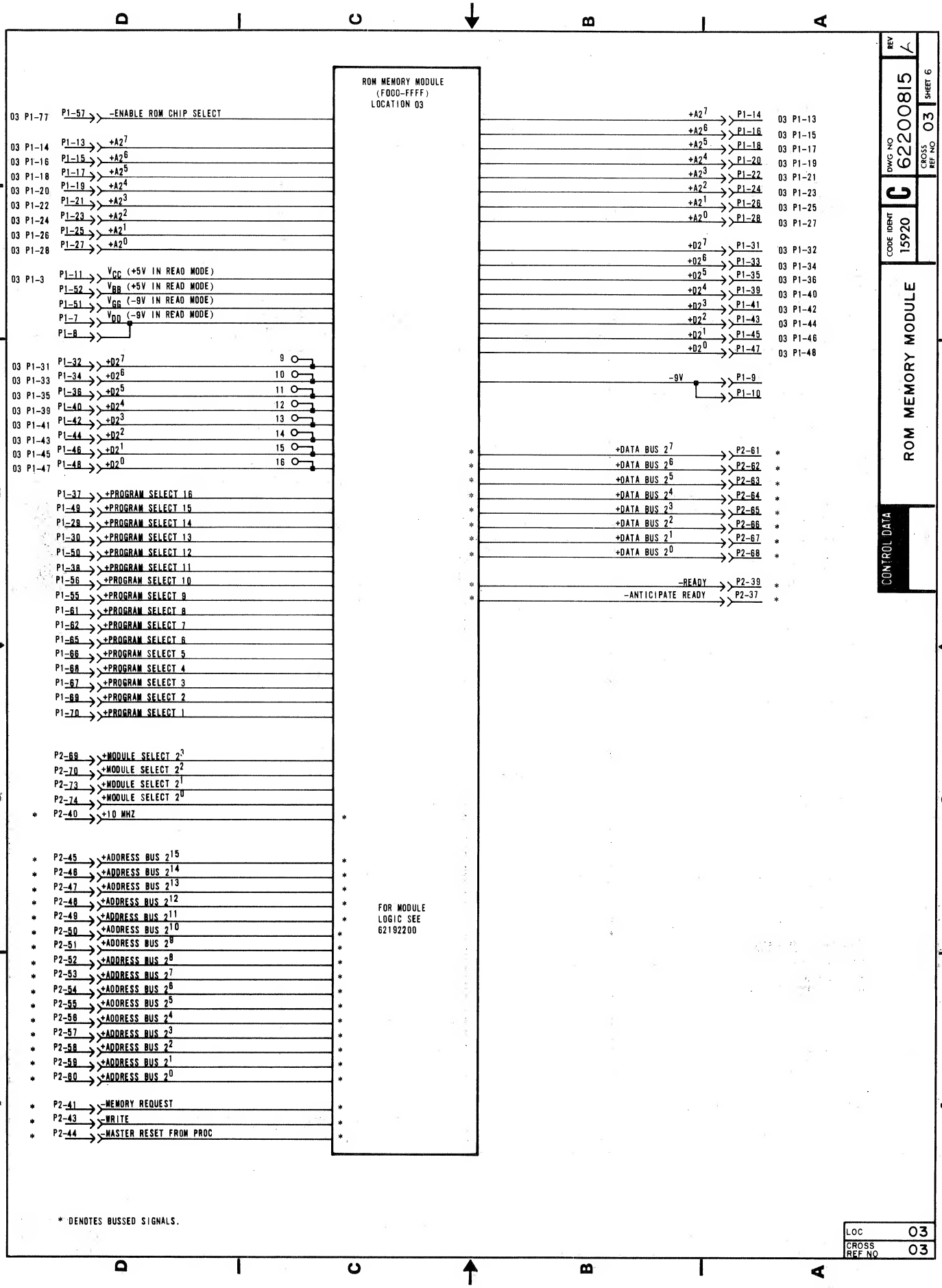

+5V REGULATOR
(SLAVE)
LOCATION A01
B01 P1-11
P1-11
CURRENT SHARING
B01 P1-10
P1-9
DRIVER IN
B01 P1-7
P1-8
OVERCURRENT IN
J11-6
P1-75
P1-76
-20V INPUT
-18V
-20V BUS
J11-3
P1-67
P1-68
P1-69
P1-70
+20V INPUT
+18V
+20V BUS
SEE CROSS REF 13
J11-9
J11-11
J11-12
P1-71
P1-72
P1-73
P1-74
INPUT GROUND
GND
OVERVOLTAGE
P1-65
P1-66
DRIVER OUT
P1-10
OVERCURRENT OUT
P1-7
+5V
+5VDC
P1-1
P1-2
P1-3
P1-4
P1-5
P1-6
+5V BUS
+5V GROUND
P1-53
P1-54
P1-55
P1-56
P1-57
P1-58
P1-77
P1-78
P1-79
P1-80
GROUND BUS
NOTE:
1 INDICATES FOIL CONNECTION ON BACKPLANE.
2 THE ACTUAL VOLTAGE MAY VARY BETWEEN +18 AND +23VDC.
REV A
DWG NO 62200815
SHEET 3
CROSS REF NO A01
CODE IDENT 15920
C
+5V REGULATOR (SLAVE)
CONTROL DATA
LOC A01
CROSS REF NO A01

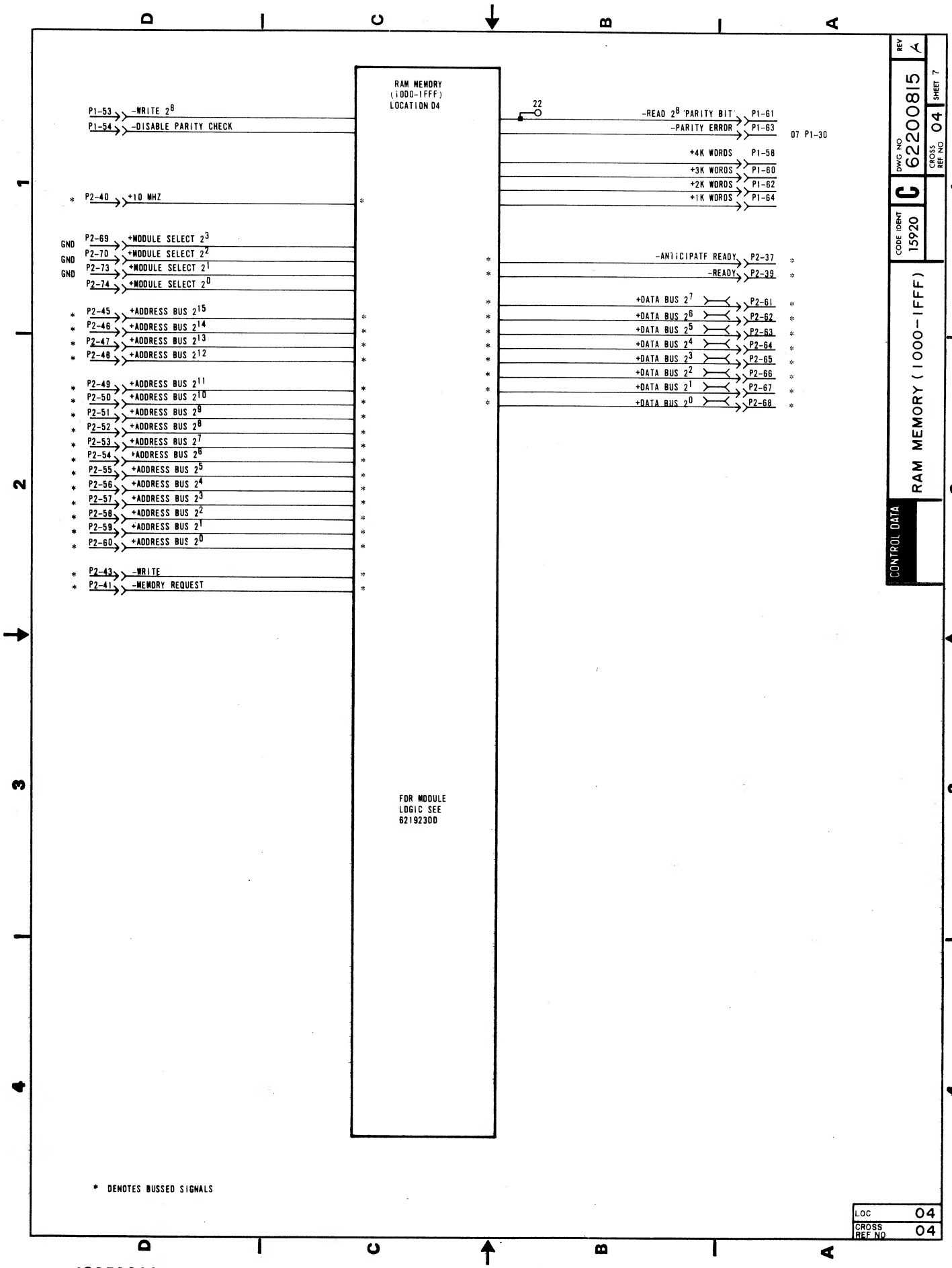


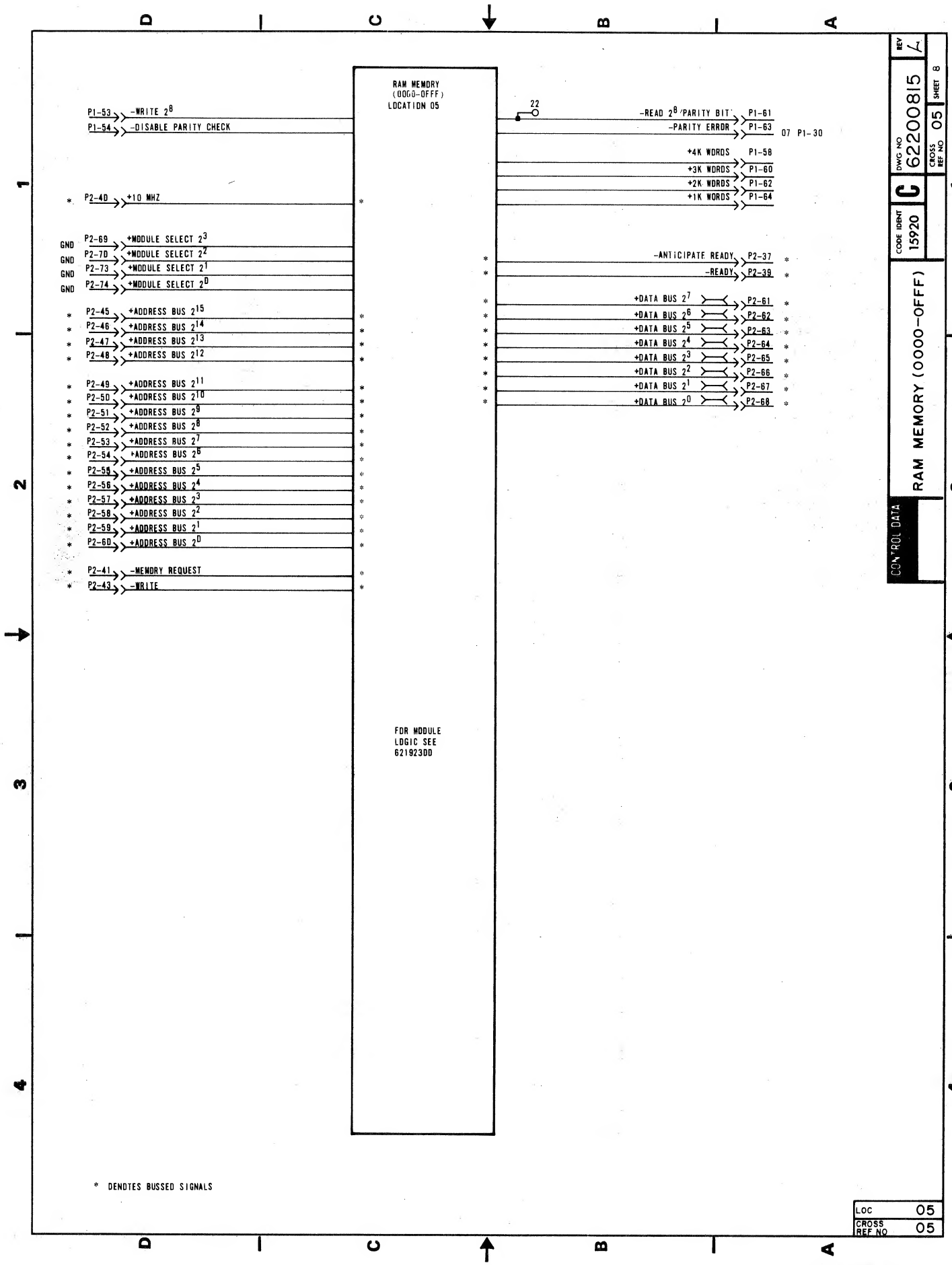
NOTES:

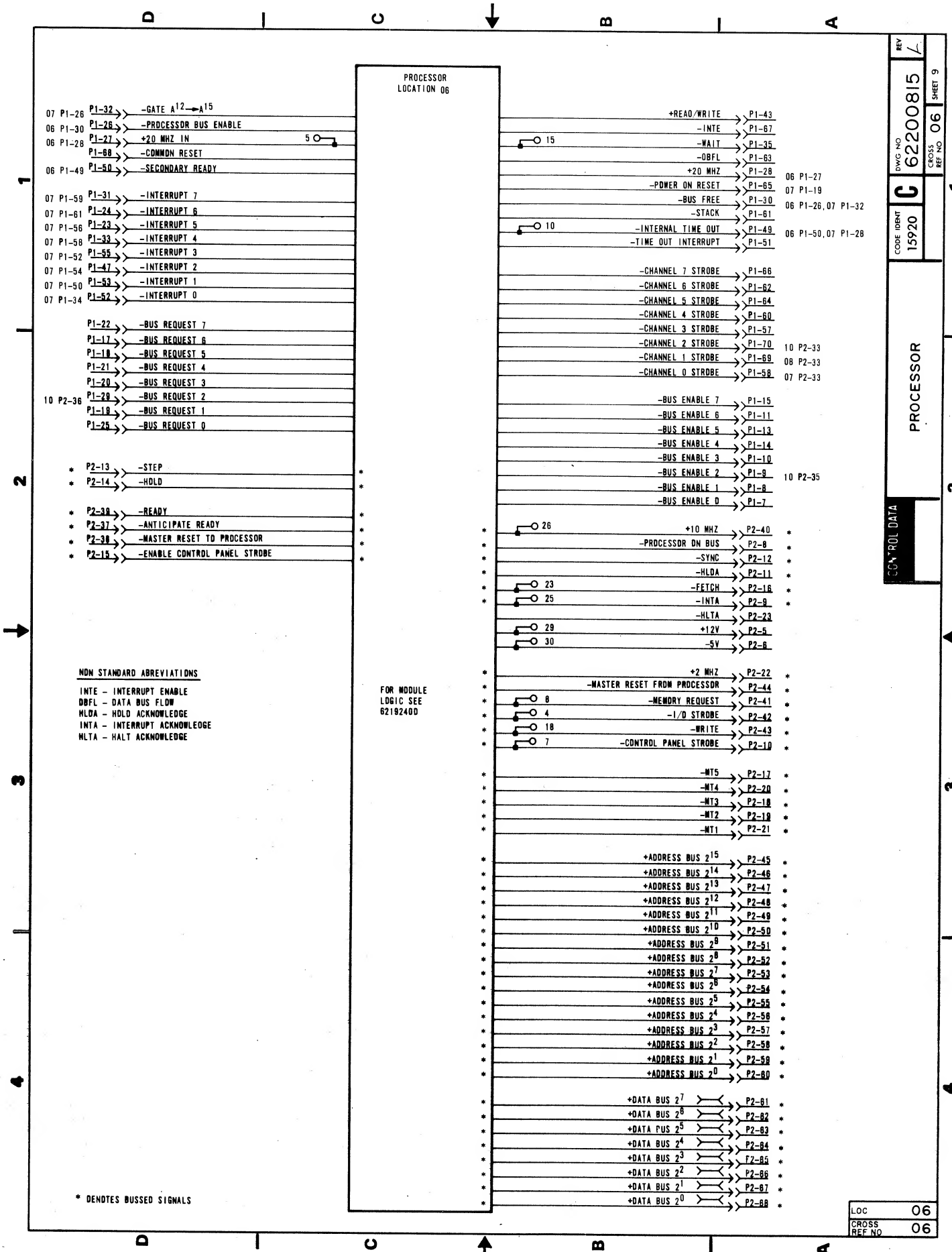
1. INDICATES FOIL CONNECTION ON BACKPLANE.
2. SIGNAL NOT USED IN +5V REGULATOR MODULE (TIE POINT ONLY).
3. THE ACTUAL VOLTAGE MAY VARY BETWEEN +18 AND +23 VDC.

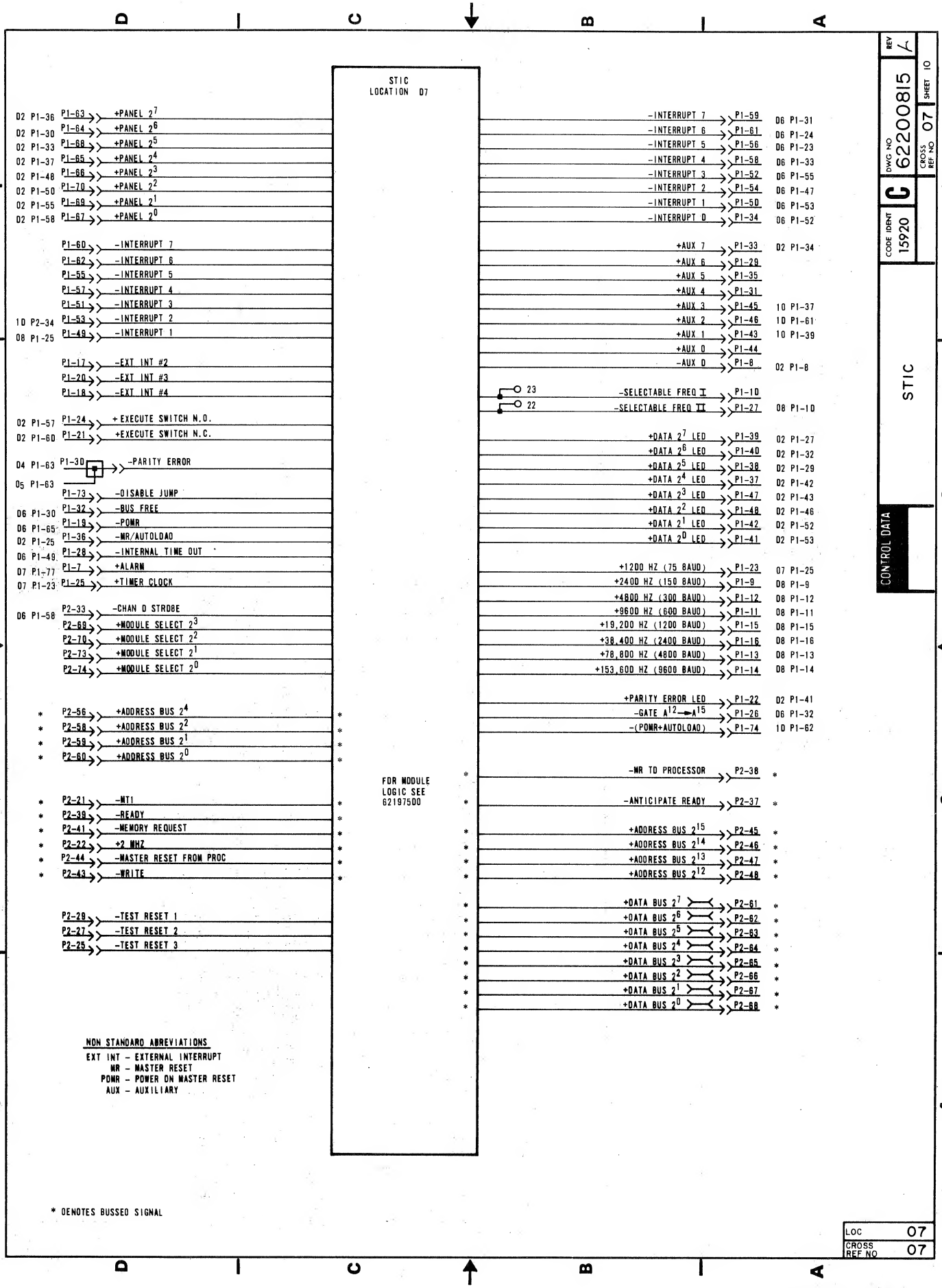

MAINT PANEL I/F CONNECTOR LOCATION 02
11 A02A-36 P1-36 +DATA SWITCH 2^7
11 A02A-30 P1-30 +DATA SWITCH 2^6
11 A02A-33 P1-33 +DATA SWITCH 2^5
11 A02A-37 P1-37 +DATA SWITCH 2^4
11 A02A-48 P1-48 +DATA SWITCH 2^3
11 A02A-50 P1-50 +DATA SWITCH 2^2
11 A02A-55 P1-55 +DATA SWITCH 2^1
11 A02A-58 P1-58 +DATA SWITCH 2^0
11 A02A-57 P1-57 +EXECUTE (NO)
11 A02A-60 P1-60 +EXECUTE (NC)
11 A02A-25 P1-25 +RESET (NO)
07 P1-39 P1-27 DATA LED 2^7
07 P1-40 P1-32 DATA LED 2^6
07 P1-38 P1-29 DATA LED 2^5
07 P1-37 P1-42 DATA LED 2^4
07 P1-47 P1-43 DATA LED 2^3
07 P1-48 P1-46 DATA LED 2^2
07 P1-42 P1-52 DATA LED 2^1
07 P1-41 P1-53 DATA LED 2^0
07 P1-22 P1-41 +PARITY ERRDR LED
08 P1-20 P1-26 CON (A)
08 P1-47 P1-28 -RCV DATA (A)
08 P1-43 P1-44 +DTR (A)
08 P1-19 P1-51 +CTS (A)
08 P1-17 P1-56 -XMT DATA (A)
08 P1-23 P1-47 +RTS (A)
07 P1-33 P1-34 +AUX RGTR 2^7
07 P1-8 P1-8 -AUX RGTR 0
+PANEL 2^7 P1-36 07 P1-63
+PANEL 2^6 P1-30 07 P1-64
+PANEL 2^5 P1-33 07 P1-68
+PANEL 2^4 P1-37 07 P1-65
+PANEL 2^3 P1-48 07 P1-66
+PANEL 2^2 P1-50 07 P1-70
+PANEL 2^1 P1-55 07 P1-69
+PANEL 2^0 P1-58 07 P1-67
+EXECUTE (NO) P1-57 07 P1-24
+EXECUTE (NC) P1-60 07 P1-21
-MR/AUTOLOAD P1-25 07 P1-36
+TERMINAL ON P1-27 11 A02A-27
+TERMINAL READY P1-32 11 A02A-32
+TERMINAL ACTIVE P1-29 11 A02A-29
+DATA LED 2^4 P1-42 11 A02A-42
+DATA LED 2^3 P1-43 11 A02A-43
+XMT REQUEST P1-46 11 A02A-46
+TRANS IN PROG P1-52 11 A02A-52
+COMM ERROR P1-53 11 A02A-53
+MEM PARITY ERRDR P1-41 11 A02A-41
+CARRIER DETECT P1-26 11 A02A-26
-RECEIVE DATA P1-28 11 A02A-28
+DTR P1-44 11 A02A-44
+CTS P1-51 11 A02A-51
-XMT DATA P1-56 11 A02A-56
+RTS P1-47 11 A02A-47
AUX RGTR 2^7 P1-34 11 A02A-34
-SONALERT P1-8 11 A02A-8
NON STANDARD ABREVIATIONS
CON - CARRIER ON
RCV - RECEIVED
AUX RGTR - AUXILIARY REGISTER
NOTE: THIS CONNECTOR LOCATION IS A TIE POINT BETWEEN STIC, ASYNC I/F-2 AND MAINT PANEL MODULES.
REV A
DWG NO 62200815
SHEET 5
CROSS REF NO 02
CODE IDENT 15920
C
CONTROL DATA
MAINT PANEL I/F CONNECTOR
LOC 02
CROSS REF NO 02

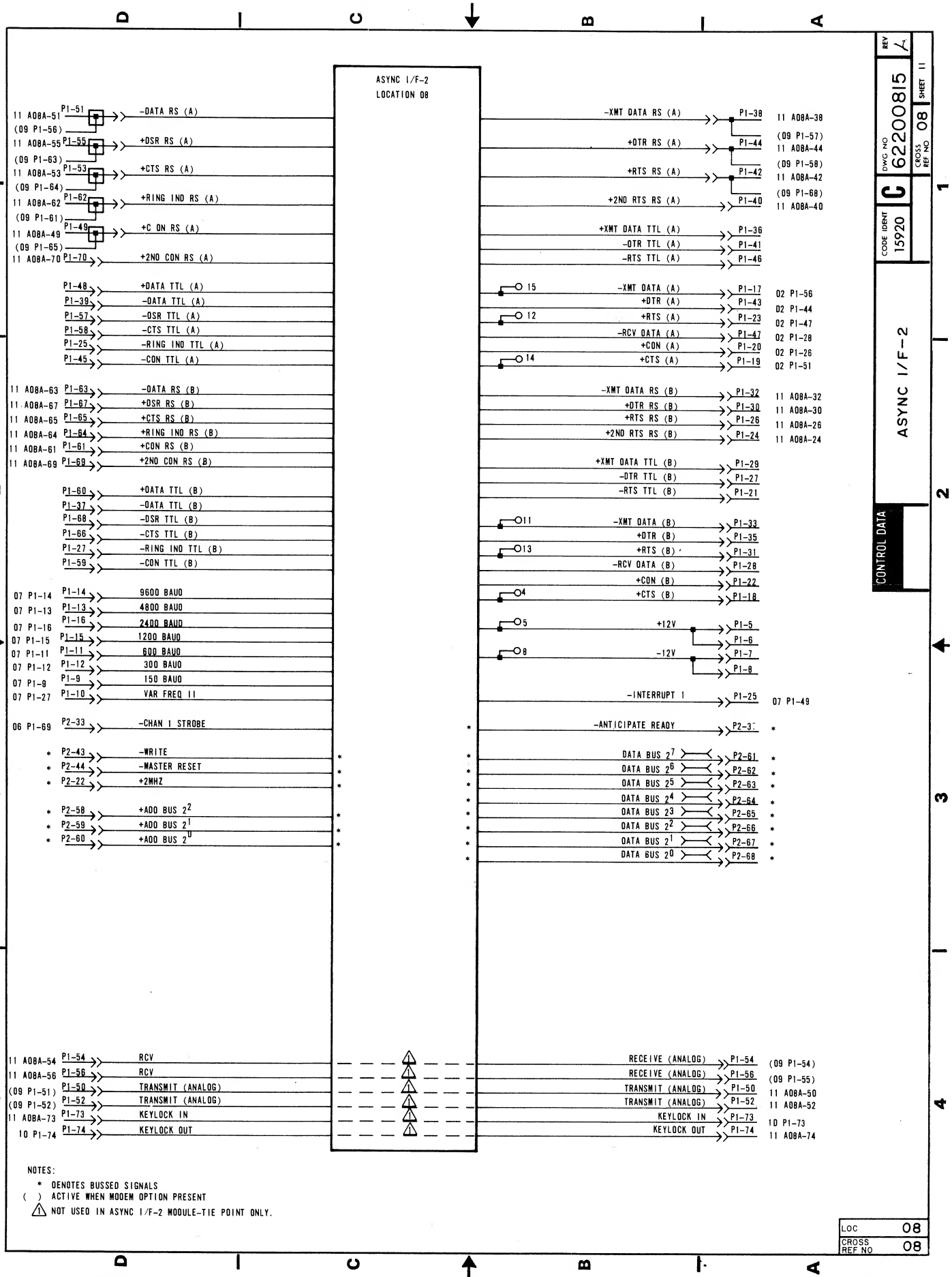

ROM MEMORY MODULE
(F000-FFFF)
LOCATION 03
03 P1-77 P1-57 -ENABLE ROM CHIP SELECT
03 P1-14 P1-13 +A2^7
03 P1-16 P1-15 +A2^6
03 P1-18 P1-17 +A2^5
03 P1-20 P1-19 +A2^4
03 P1-22 P1-21 +A2^3
03 P1-24 P1-23 +A2^2
03 P1-26 P1-25 +A2^1
03 P1-28 P1-27 +A2^0
03 P1-3 P1-11 VCC (+5V IN READ MODE)
P1-52 VBB (+5V IN READ MODE)
P1-51 VGG (-9V IN READ MODE)
P1-7 VDD (-9V IN READ MODE)
P1-8
03 P1-31 P1-32 +D2^7 9
03 P1-33 P1-34 +D2^6 10
03 P1-35 P1-36 +D2^5 11
03 P1-39 P1-40 +D2^4 12
03 P1-41 P1-42 +D2^3 13
03 P1-43 P1-44 +D2^2 14
03 P1-45 P1-46 +D2^1 15
03 P1-47 P1-48 +D2^0 16
P1-37 +PROGRAM SELECT 16
P1-49 +PROGRAM SELECT 15
P1-29 +PROGRAM SELECT 14
P1-30 +PROGRAM SELECT 13
P1-50 +PROGRAM SELECT 12
P1-38 +PROGRAM SELECT 11
P1-56 +PROGRAM SELECT 10
P1-55 +PROGRAM SELECT 9
P1-61 +PROGRAM SELECT 8
P1-62 +PROGRAM SELECT 7
P1-65 +PROGRAM SELECT 6
P1-66 +PROGRAM SELECT 5
P1-68 +PROGRAM SELECT 4
P1-67 +PROGRAM SELECT 3
P1-69 +PROGRAM SELECT 2
P1-70 +PROGRAM SELECT 1
P2-69 +MODULE SELECT 2^3
P2-70 +MODULE SELECT 2^2
P2-73 +MODULE SELECT 2^1
P2-74 +MODULE SELECT 2^0
* P2-40 +10 MHZ *
* P2-45 +ADDRESS BUS 2^15 *
* P2-46 +ADDRESS BUS 2^14 *
* P2-47 +ADDRESS BUS 2^13 *
* P2-48 +ADDRESS BUS 2^12 *
* P2-49 +ADDRESS BUS 2^11 *
* P2-50 +ADDRESS BUS 2^10 *
* P2-51 +ADDRESS BUS 2^9 *
* P2-52 +ADDRESS BUS 2^8 *
* P2-53 +ADDRESS BUS 2^7 *
* P2-54 +ADDRESS BUS 2^6 *
* P2-55 +ADDRESS BUS 2^5 *
* P2-56 +ADDRESS BUS 2^4 *
* P2-57 +ADDRESS BUS 2^3 *
* P2-58 +ADDRESS BUS 2^2 *
* P2-59 +ADDRESS BUS 2^1 *
* P2-60 +ADDRESS BUS 2^0 *
* P2-41 -MEMORY REQUEST *
* P2-43 -WRITE *
* P2-44 -MASTER RESET FROM PROC *
FOR MODULE LOGIC SEE 62192200
+A2^7 P1-14 03 P1-13
+A2^6 P1-16 03 P1-15
+A2^5 P1-18 03 P1-17
+A2^4 P1-20 03 P1-19
+A2^3 P1-22 03 P1-21
+A2^2 P1-24 03 P1-23
+A2^1 P1-26 03 P1-25
+A2^0 P1-28 03 P1-27
+D2^7 P1-31 03 P1-32
+D2^6 P1-33 03 P1-34
+D2^5 P1-35 03 P1-36
+D2^4 P1-39 03 P1-40
+D2^3 P1-41 03 P1-42
+D2^2 P1-43 03 P1-44
+D2^1 P1-45 03 P1-46
+D2^0 P1-47 03 P1-48
-9V P1-9
P1-10
* +DATA BUS 2^7 P2-61 *
* +DATA BUS 2^6 P2-62 *
* +DATA BUS 2^5 P2-63 *
* +DATA BUS 2^4 P2-64 *
* +DATA BUS 2^3 P2-65 *
* +DATA BUS 2^2 P2-66 *
* +DATA BUS 2^1 P2-67 *
* +DATA BUS 2^0 P2-68 *
* -READY P2-39 *
* -ANTICIPATE READY P2-37 *
REV A
DWG NO 62200815
SHEET 6
CROSS REF NO 03
CODE IDENT 15920
C
ROM MEMORY MODULE
CONTROL DATA
LOC 03
CROSS REF NO 03
* DENOTES BUSSED SIGNALS.

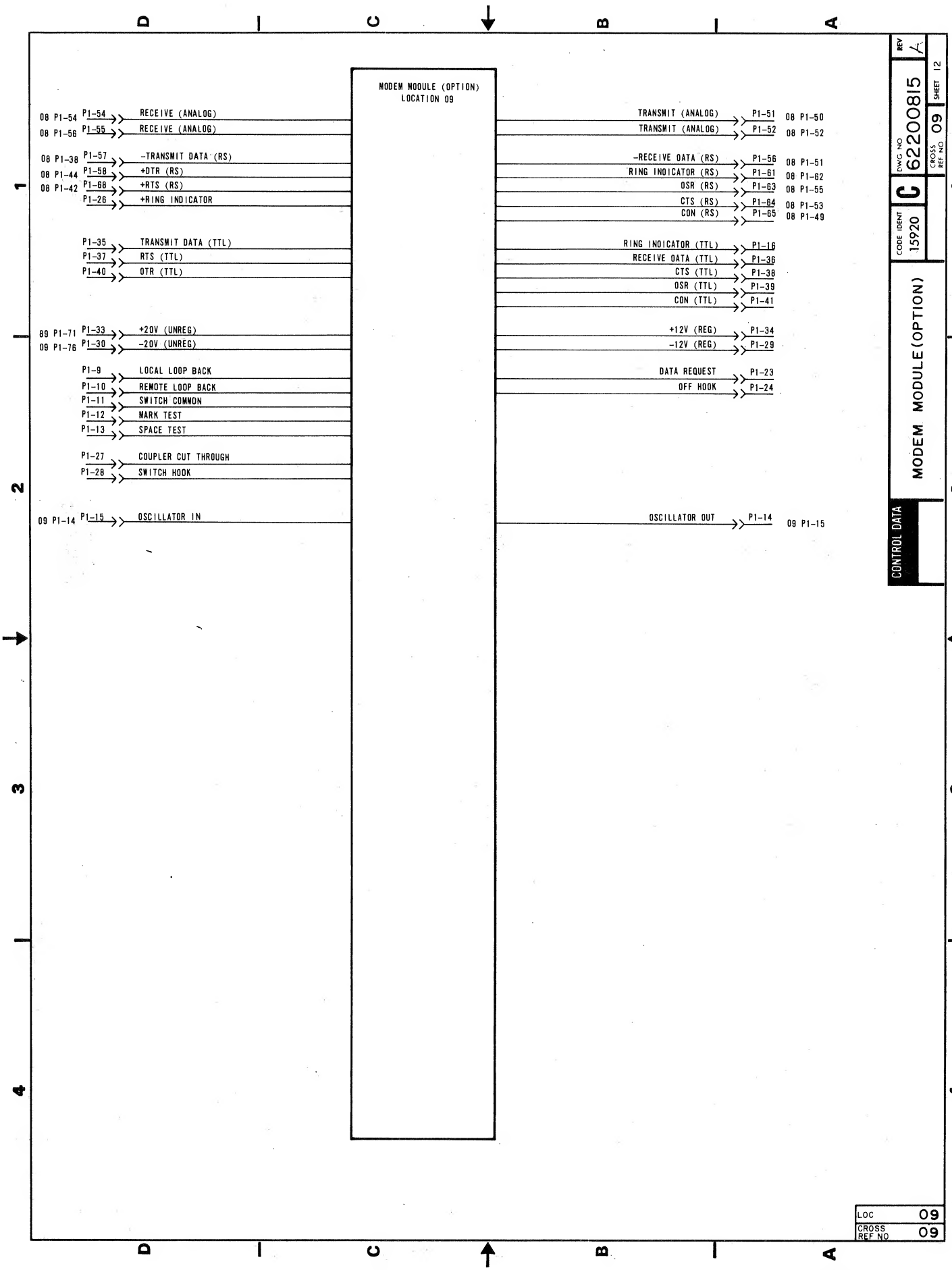

RAM MEMORY
(1000-1FFF)
LOCATION 04
P1-53 -WRITE 2^8
P1-54 -DISABLE PARITY CHECK
* P2-40 +10 MHZ
GND P2-69 +MODULE SELECT 2^3
GND P2-70 +MODULE SELECT 2^2
GND P2-73 +MODULE SELECT 2^1
P2-74 +MODULE SELECT 2^0
* P2-45 +ADDRESS BUS 2^15
* P2-46 +ADDRESS BUS 2^14
* P2-47 +ADDRESS BUS 2^13
* P2-48 +ADDRESS BUS 2^12
* P2-49 +ADDRESS BUS 2^11
* P2-50 +ADDRESS BUS 2^10
* P2-51 +ADDRESS BUS 2^9
* P2-52 +ADDRESS BUS 2^8
* P2-53 +ADDRESS BUS 2^7
* P2-54 +ADDRESS BUS 2^6
* P2-55 +ADDRESS BUS 2^5
* P2-56 +ADDRESS BUS 2^4
* P2-57 +ADDRESS BUS 2^3
* P2-58 +ADDRESS BUS 2^2
* P2-59 +ADDRESS BUS 2^1
* P2-60 +ADDRESS BUS 2^0
* P2-43 -WRITE
* P2-41 -MEMORY REQUEST
22
-READ 2^8 PARITY BIT P1-61
-PARITY ERROR P1-63
07 P1-30
+4K WORDS P1-58
+3K WORDS P1-60
+2K WORDS P1-62
+1K WORDS P1-64
* -ANTICIPATE READY P2-37 *
* -READY P2-39 *
* +DATA BUS 2^7 P2-61 *
* +DATA BUS 2^6 P2-62 *
* +DATA BUS 2^5 P2-63 *
* +DATA BUS 2^4 P2-64 *
* +DATA BUS 2^3 P2-65 *
* +DATA BUS 2^2 P2-66 *
* +DATA BUS 2^1 P2-67 *
* +DATA BUS 2^0 P2-68 *
FOR MODULE
LOGIC SEE
6219230D
* DENOTES BUSSED SIGNALS
REV A
DWG NO 62200815
CODE IDENT 15920
C
CROSS REF NO 04
SHEET 7
RAM MEMORY (1000-1FFF)
CONTROL DATA
LOC 04
CROSS REF NO 04

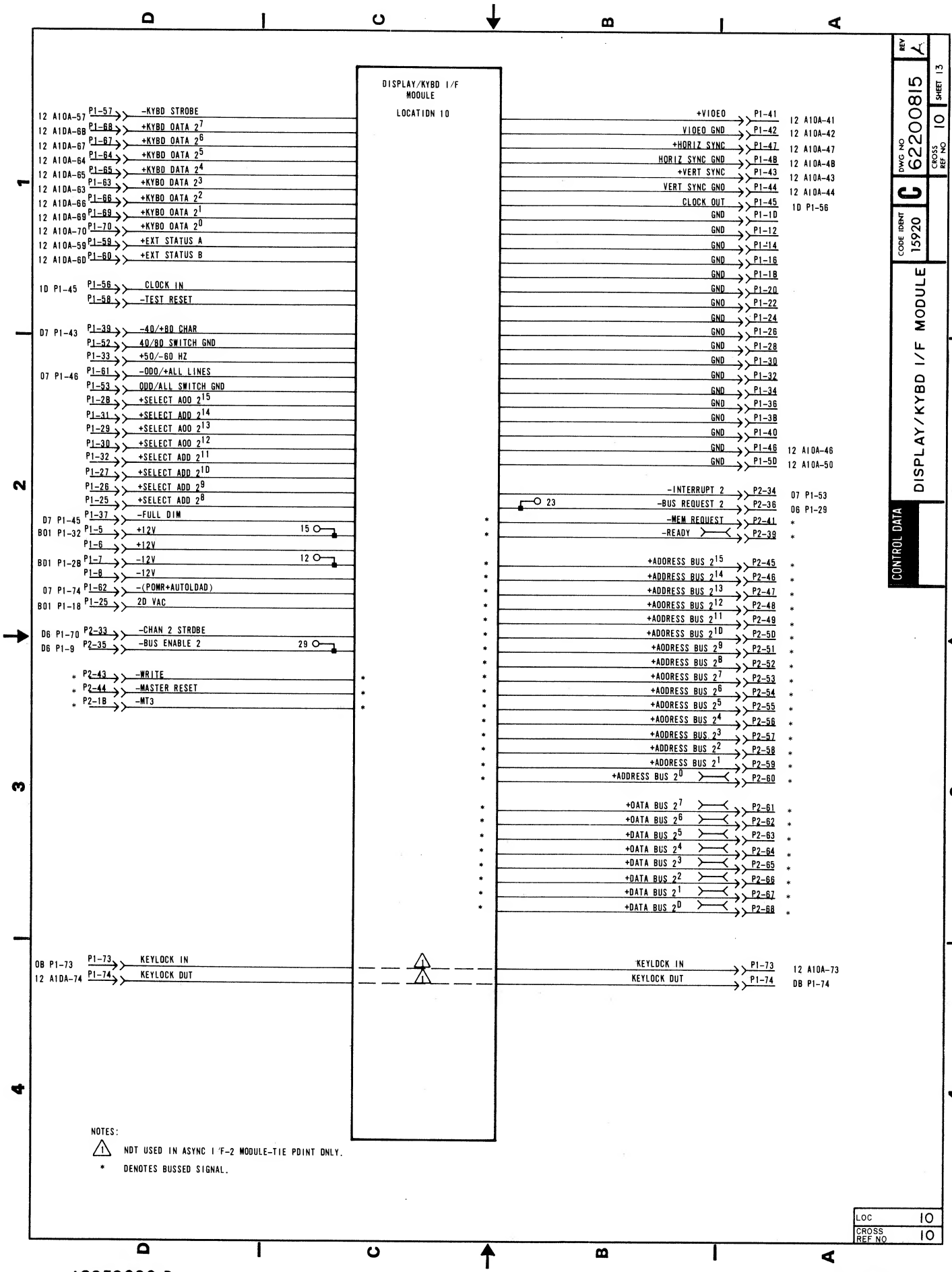

RAM MEMORY
(0000-0FFF)
LOCATION 05
P1-53 -WRITE 2^8
P1-54 -DISABLE PARITY CHECK
* P2-40 +10 MHZ
GND P2-69 +MODULE SELECT 2^3
GND P2-70 +MODULE SELECT 2^2
GND P2-73 +MODULE SELECT 2^1
GND P2-74 +MODULE SELECT 2^0
* P2-45 +ADDRESS BUS 2^15
* P2-46 +ADDRESS BUS 2^14
* P2-47 +ADDRESS BUS 2^13
* P2-48 +ADDRESS BUS 2^12
* P2-49 +ADDRESS BUS 2^11
* P2-50 +ADDRESS BUS 2^10
* P2-51 +ADDRESS BUS 2^9
* P2-52 +ADDRESS BUS 2^8
* P2-53 +ADDRESS BUS 2^7
* P2-54 +ADDRESS BUS 2^6
* P2-55 +ADDRESS BUS 2^5
* P2-56 +ADDRESS BUS 2^4
* P2-57 +ADDRESS BUS 2^3
* P2-58 +ADDRESS BUS 2^2
* P2-59 +ADDRESS BUS 2^1
* P2-60 +ADDRESS BUS 2^0
* P2-41 -MEMORY REQUEST
* P2-43 -WRITE
22
-READ 2^8/PARITY BIT P1-61
-PARITY ERROR P1-63
07 P1-30
+4K WORDS P1-58
+3K WORDS P1-60
+2K WORDS P1-62
+1K WORDS P1-64
* -ANTICIPATE READY P2-37 *
* -READY P2-39 *
* +DATA BUS 2^7 P2-61 *
* +DATA BUS 2^6 P2-62 *
* +DATA BUS 2^5 P2-63 *
* +DATA BUS 2^4 P2-64 *
* +DATA BUS 2^3 P2-65 *
* +DATA BUS 2^2 P2-66 *
* +DATA BUS 2^1 P2-67 *
* +DATA BUS 2^0 P2-68 *
FOR MODULE
LOGIC SEE
621923DD
* DENOTES BUSSED SIGNALS
REV J
DWG NO 62200815
SHEET 8
CROSS REF NO 05
CODE IDENT 15920
C
RAM MEMORY (0000-0FFF)
CONTROL DATA
LOC 05
CROSS REF NO 05

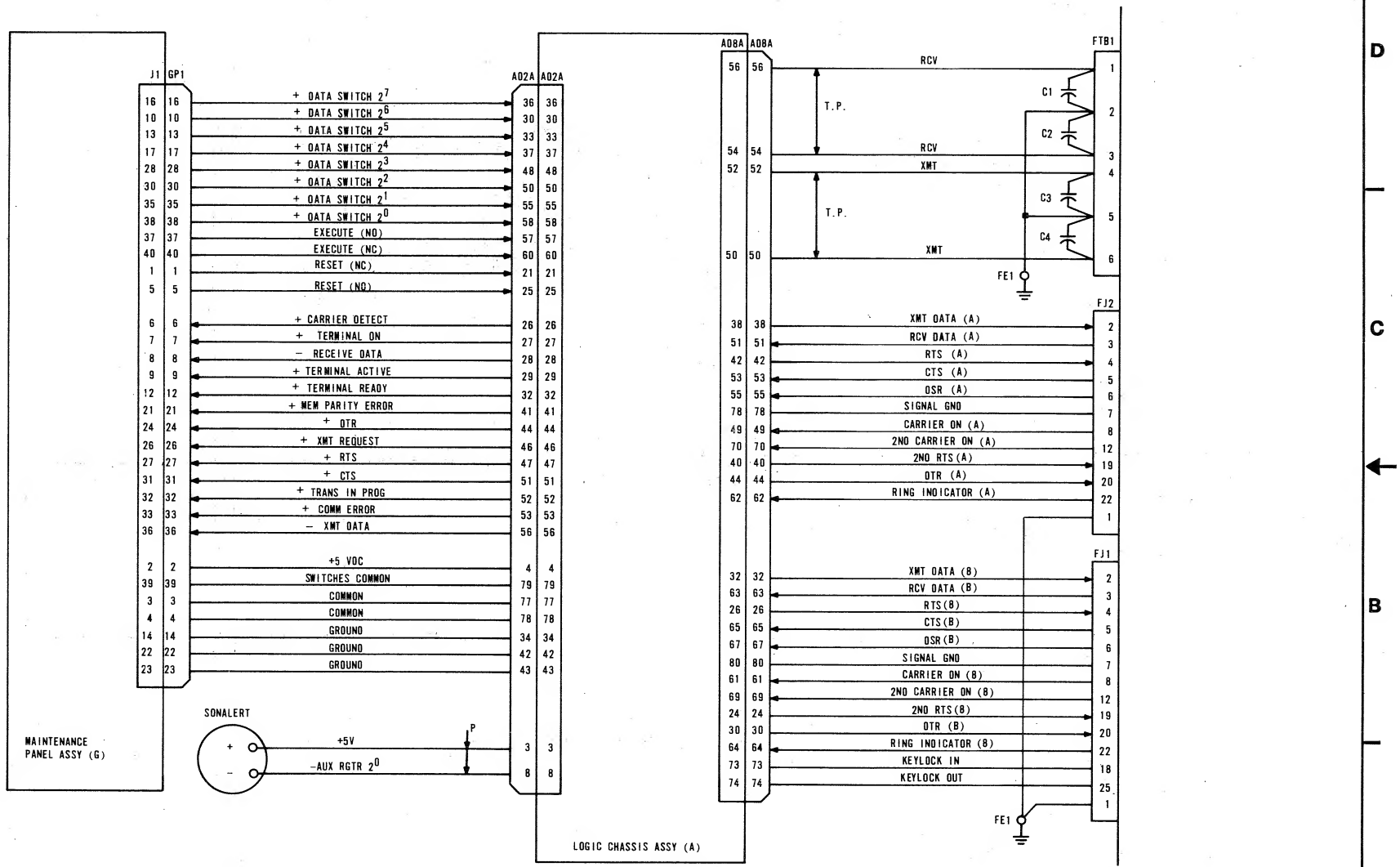

PROCESSOR
LOCATION 06
07 P1-26 P1-32 -GATE A12→A15
06 P1-30 P1-26 -PROCESSOR BUS ENABLE
06 P1-28 P1-27 +20 MHZ IN
P1-68 -COMMON RESET
06 P1-49 P1-50 -SECONDARY READY
07 P1-59 P1-31 -INTERRUPT 7
07 P1-61 P1-24 -INTERRUPT 6
07 P1-56 P1-23 -INTERRUPT 5
07 P1-58 P1-33 -INTERRUPT 4
07 P1-52 P1-55 -INTERRUPT 3
07 P1-54 P1-47 -INTERRUPT 2
07 P1-50 P1-53 -INTERRUPT 1
07 P1-34 P1-52 -INTERRUPT 0
P1-22 -BUS REQUEST 7
P1-17 -BUS REQUEST 6
P1-18 -BUS REQUEST 5
P1-21 -BUS REQUEST 4
P1-20 -BUS REQUEST 3
10 P2-36 P1-29 -BUS REQUEST 2
P1-19 -BUS REQUEST 1
P1-25 -BUS REQUEST 0
* P2-13 -STEP
* P2-14 -HOLD
* P2-39 -READY
* P2-37 -ANTICIPATE READY
* P2-38 -MASTER RESET TO PROCESSOR
* P2-15 -ENABLE CONTROL PANEL STROBE
+READ/WRITE P1-43
-INTE P1-67
15 -WAIT P1-35
-DBFL P1-63
+20 MHZ P1-28 06 P1-27
-POWER ON RESET P1-65 07 P1-19
-BUS FREE P1-30 06 P1-26, 07 P1-32
-STACK P1-61
10 -INTERNAL TIME OUT P1-49 06 P1-50, 07 P1-28
-TIME OUT INTERRUPT P1-51
-CHANNEL 7 STROBE P1-66
-CHANNEL 6 STROBE P1-62
-CHANNEL 5 STROBE P1-64
-CHANNEL 4 STROBE P1-60
-CHANNEL 3 STROBE P1-57
-CHANNEL 2 STROBE P1-70 10 P2-33
-CHANNEL 1 STROBE P1-69 08 P2-33
-CHANNEL 0 STROBE P1-58 07 P2-33
-BUS ENABLE 7 P1-15
-BUS ENABLE 6 P1-11
-BUS ENABLE 5 P1-13
-BUS ENABLE 4 P1-14
-BUS ENABLE 3 P1-10
-BUS ENABLE 2 P1-9 10 P2-35
-BUS ENABLE 1 P1-8
-BUS ENABLE 0 P1-7
26 +10 MHZ P2-40 *
* -PROCESSOR ON BUS P2-8 *
* -SYNC P2-12 *
* -HLDA P2-11 *
23 * -FETCH P2-16 *
25 * -INTA P2-9 *
-HLTA P2-23
29 +12V P2-5
30 -5V P2-6
* +2 MHZ P2-22 *
* -MASTER RESET FROM PROCESSOR P2-44 *
8 * -MEMORY REQUEST P2-41 *
4 * -I/O STROBE P2-42 *
18 * -WRITE P2-43 *
7 * -CONTROL PANEL STROBE P2-10 *
* -MT5 P2-17 *
* -MT4 P2-20 *
* -MT3 P2-18 *
* -MT2 P2-19 *
* -MT1 P2-21 *
* +ADDRESS BUS 215 P2-45 *
* +ADDRESS BUS 214 P2-46 *
* +ADDRESS BUS 213 P2-47 *
* +ADDRESS BUS 212 P2-48 *
* +ADDRESS BUS 211 P2-49 *
* +ADDRESS BUS 210 P2-50 *
* +ADDRESS BUS 29 P2-51 *
* +ADDRESS BUS 28 P2-52 *
* +ADDRESS BUS 27 P2-53 *
* +ADDRESS BUS 26 P2-54 *
* +ADDRESS BUS 25 P2-55 *
* +ADDRESS BUS 24 P2-56 *
* +ADDRESS BUS 23 P2-57 *
* +ADDRESS BUS 22 P2-58 *
* +ADDRESS BUS 21 P2-59 *
* +ADDRESS BUS 20 P2-60 *
* +DATA BUS 27 P2-61 *
* +DATA BUS 26 P2-62 *
* +DATA BUS 25 P2-63 *
* +DATA BUS 24 P2-64 *
* +DATA BUS 23 P2-65 *
* +DATA BUS 22 P2-66 *
* +DATA BUS 21 P2-67 *
* +DATA BUS 20 P2-68 *
FOR MODULE LOGIC SEE 62192400
NON STANDARD ABREVIATIONS
INTE - INTERRUPT ENABLE
DBFL - DATA BUS FLOW
HLDA - HOLD ACKNOWLEDGE
INTA - INTERRUPT ACKNOWLEDGE
HLTA - HALT ACKNOWLEDGE
* DENOTES BUSSED SIGNALS
REV
DWG NO 62200815
SHEET 9
CROSS REF NO 06
CODE IDENT 15920
C
PROCESSOR
CONTROL DATA
LOC 06
CROSS REF NO 06


STIC
LOCATION D7
D2 P1-36 P1-63 +PANEL 2^7
D2 P1-30 P1-64 +PANEL 2^6
D2 P1-33 P1-68 +PANEL 2^5
D2 P1-37 P1-65 +PANEL 2^4
D2 P1-48 P1-66 +PANEL 2^3
D2 P1-50 P1-70 +PANEL 2^2
D2 P1-55 P1-69 +PANEL 2^1
D2 P1-58 P1-67 +PANEL 2^0
P1-60 -INTERRUPT 7
P1-62 -INTERRUPT 6
P1-55 -INTERRUPT 5
P1-57 -INTERRUPT 4
P1-51 -INTERRUPT 3
10 P2-34 P1-53 -INTERRUPT 2
08 P1-25 P1-49 -INTERRUPT 1
P1-17 -EXT INT #2
P1-20 -EXT INT #3
P1-18 -EXT INT #4
D2 P1-57 P1-24 +EXECUTE SWITCH N.O.
D2 P1-60 P1-21 +EXECUTE SWITCH N.C.
D4 P1-63 P1-30 -PARITY ERROR
05 P1-63
P1-73 -DISABLE JUMP
D6 P1-30 P1-32 -BUS FREE
D6 P1-65 P1-19 -POWR
D2 P1-25 P1-36 -MR/AUTOLOAD
D6 P1-49 P1-28 -INTERNAL TIME OUT
D7 P1-77 P1-7 +ALARM
07 P1-23 P1-25 +TIMER CLOCK
D6 P1-58 P2-33 -CHAN D STROBE
P2-69 +MODULE SELECT 2^3
P2-70 +MODULE SELECT 2^2
P2-73 +MODULE SELECT 2^1
P2-74 +MODULE SELECT 2^0
* P2-56 +ADDRESS BUS 2^4 *
* P2-58 +ADDRESS BUS 2^2 *
* P2-59 +ADDRESS BUS 2^1 *
* P2-60 +ADDRESS BUS 2^0 *
* P2-21 -MT1 *
* P2-39 -READY *
* P2-41 -MEMORY REQUEST *
* P2-22 +2 MHZ *
* P2-44 -MASTER RESET FROM PROC *
* P2-43 -WRITE *
P2-29 -TEST RESET 1
P2-27 -TEST RESET 2
P2-25 -TEST RESET 3
FOR MODULE LOGIC SEE 6219750D
-INTERRUPT 7 P1-59 D6 P1-31
-INTERRUPT 6 P1-61 D6 P1-24
-INTERRUPT 5 P1-56 D6 P1-23
-INTERRUPT 4 P1-58 D6 P1-33
-INTERRUPT 3 P1-52 D6 P1-55
-INTERRUPT 2 P1-54 D6 P1-47
-INTERRUPT 1 P1-50 D6 P1-53
-INTERRUPT 0 P1-34 D6 P1-52
+AUX 7 P1-33 D2 P1-34
+AUX 6 P1-29
+AUX 5 P1-35
+AUX 4 P1-31
+AUX 3 P1-45 10 P1-37
+AUX 2 P1-46 10 P1-61
+AUX 1 P1-43 10 P1-39
+AUX 0 P1-44
-AUX 0 P1-8 02 P1-8
23 -SELECTABLE FREQ I P1-10
22 -SELECTABLE FREQ II P1-27 08 P1-10
+DATA 2^7 LED P1-39 02 P1-27
+DATA 2^6 LED P1-40 02 P1-32
+DATA 2^5 LED P1-38 02 P1-29
+DATA 2^4 LED P1-37 02 P1-42
+DATA 2^3 LED P1-47 02 P1-43
+DATA 2^2 LED P1-48 02 P1-46
+DATA 2^1 LED P1-42 02 P1-52
+DATA 2^0 LED P1-41 02 P1-53
+1200 HZ (75 BAUD) P1-23 07 P1-25
+2400 HZ (150 BAUD) P1-9 08 P1-9
+4800 HZ (300 BAUD) P1-12 08 P1-12
+9600 HZ (600 BAUD) P1-11 08 P1-11
+19,200 HZ (1200 BAUD) P1-15 08 P1-15
+38,400 HZ (2400 BAUD) P1-16 08 P1-16
+78,800 HZ (4800 BAUD) P1-13 08 P1-13
+153,600 HZ (9600 BAUD) P1-14 08 P1-14
+PARITY ERROR LED P1-22 02 P1-41
-GATE A12→A15 P1-26 06 P1-32
-(POWR+AUTOLOAD) P1-74 10 P1-62
* -MR TO PROCESSOR P2-38 *
* -ANTICIPATE READY P2-37 *
* +ADDRESS BUS 2^15 P2-45 *
* +ADDRESS BUS 2^14 P2-46 *
* +ADDRESS BUS 2^13 P2-47 *
* +ADDRESS BUS 2^12 P2-48 *
* +DATA BUS 2^7 P2-61 *
* +DATA BUS 2^6 P2-62 *
* +DATA BUS 2^5 P2-63 *
* +DATA BUS 2^4 P2-64 *
* +DATA BUS 2^3 P2-65 *
* +DATA BUS 2^2 P2-66 *
* +DATA BUS 2^1 P2-67 *
* +DATA BUS 2^0 P2-68 *
NON STANDARD ABREVIATIONS
EXT INT - EXTERNAL INTERRUPT
MR - MASTER RESET
POWR - POWER ON MASTER RESET
AUX - AUXILIARY
* DENOTES BUSSED SIGNAL
REV A
DWG NO 62200815
SHEET 10
CROSS REF NO 07
CODE IDENT 15920
C
STIC
CONTROL DATA
LOC 07
CROSS REF NO 07

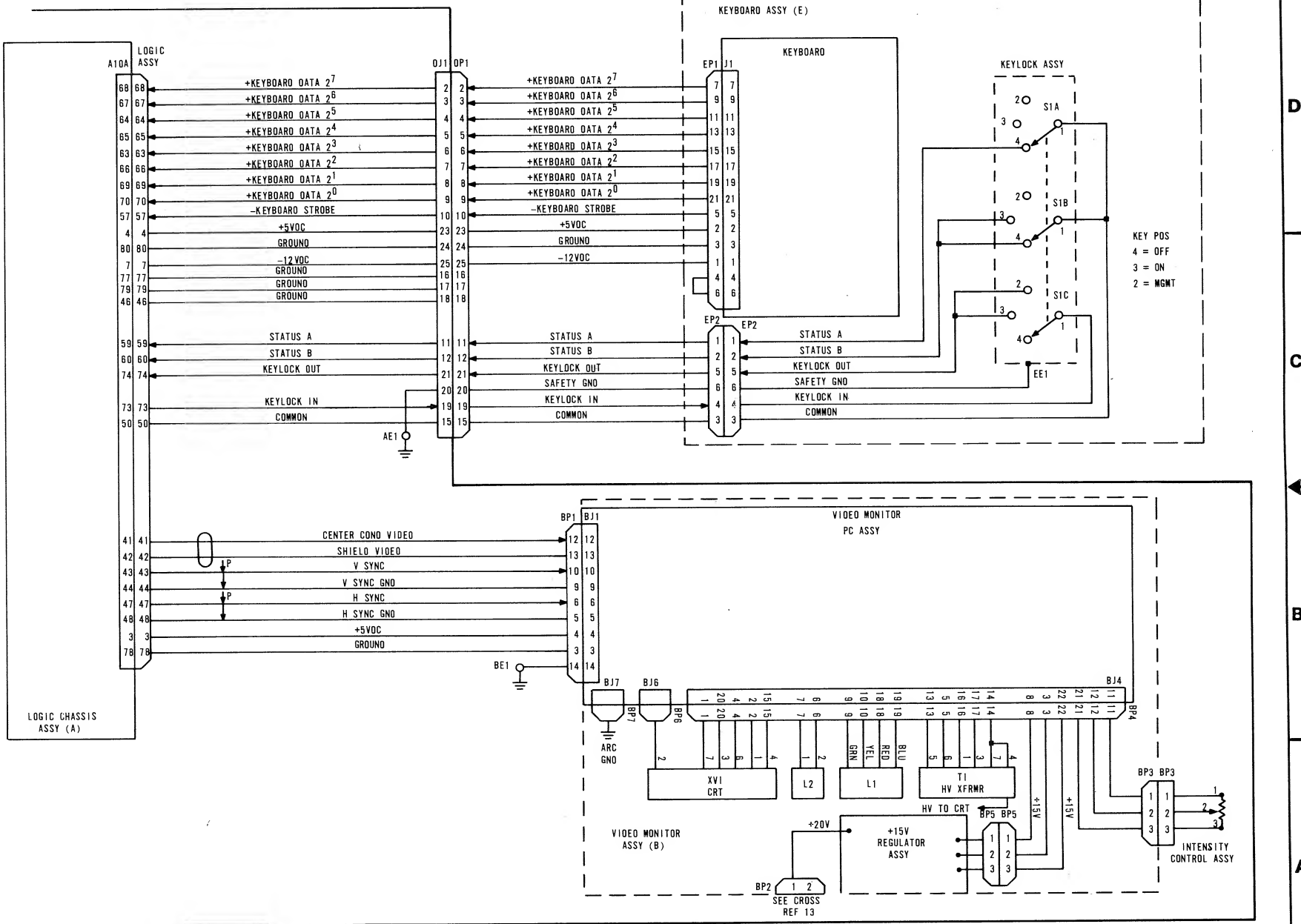

ASYNC I/F-2
LOCATION 08
11 A08A-51 P1-51 -DATA RS (A)
(09 P1-56)
11 A08A-55 P1-55 +DSR RS (A)
(09 P1-63)
11 A08A-53 P1-53 +CTS RS (A)
(09 P1-64)
11 A08A-62 P1-62 +RING IND RS (A)
(09 P1-61)
11 A08A-49 P1-49 +C ON RS (A)
(09 P1-65)
11 A08A-70 P1-70 +2NO CON RS (A)
P1-48 +DATA TTL (A)
P1-39 -DATA TTL (A)
P1-57 -DSR TTL (A)
P1-58 -CTS TTL (A)
P1-25 -RING IND TTL (A)
P1-45 -CON TTL (A)
11 A08A-63 P1-63 -DATA RS (B)
11 A08A-67 P1-67 +DSR RS (B)
11 A08A-65 P1-65 +CTS RS (B)
11 A08A-64 P1-64 +RING IND RS (B)
11 A08A-61 P1-61 +CON RS (B)
11 A08A-69 P1-69 +2NO CON RS (B)
P1-60 +DATA TTL (B)
P1-37 -DATA TTL (B)
P1-68 -DSR TTL (B)
P1-66 -CTS TTL (B)
P1-27 -RING IND TTL (B)
P1-59 -CON TTL (B)
07 P1-14 P1-14 9600 BAUD
07 P1-13 P1-13 4800 BAUD
07 P1-16 P1-16 2400 BAUD
07 P1-15 P1-15 1200 BAUD
07 P1-11 P1-11 600 BAUD
07 P1-12 P1-12 300 BAUD
07 P1-9 P1-9 150 BAUD
07 P1-27 P1-10 VAR FREQ II
06 P1-69 P2-33 -CHAN I STROBE
* P2-43 -WRITE
* P2-44 -MASTER RESET
* P2-22 +2MHZ
* P2-58 +ADD BUS 2^2
* P2-59 +ADD BUS 2^1
* P2-60 +ADD BUS 2^0
11 A08A-54 P1-54 RCV
11 A08A-56 P1-56 RCV
(09 P1-51) P1-50 TRANSMIT (ANALOG)
(09 P1-52) P1-52 TRANSMIT (ANALOG)
11 A08A-73 P1-73 KEYLOCK IN
10 P1-74 P1-74 KEYLOCK OUT
-XMT DATA RS (A) P1-38 11 A08A-38
+DTR RS (A) P1-44 (09 P1-57) 11 A08A-44
+RTS RS (A) P1-42 (09 P1-58) 11 A08A-42
+2ND RTS RS (A) P1-40 (09 P1-68) 11 A08A-40
+XMT DATA TTL (A) P1-36
-DTR TTL (A) P1-41
-RTS TTL (A) P1-46
15 -XMT DATA (A) P1-17 02 P1-56
+DTR (A) P1-43 02 P1-44
12 +RTS (A) P1-23 02 P1-47
-RCV DATA (A) P1-47 02 P1-28
+CON (A) P1-20 02 P1-26
14 +CTS (A) P1-19 02 P1-51
-XMT DATA RS (B) P1-32 11 A08A-32
+DTR RS (B) P1-30 11 A08A-30
+RTS RS (B) P1-26 11 A08A-26
+2ND RTS RS (B) P1-24 11 A08A-24
+XMT DATA TTL (B) P1-29
-DTR TTL (B) P1-27
-RTS TTL (B) P1-21
11 -XMT DATA (B) P1-33
+DTR (B) P1-35
13 +RTS (B) P1-31
-RCV DATA (B) P1-28
+CON (B) P1-22
4 +CTS (B) P1-18
5 +12V P1-5 P1-6
8 -12V P1-7 P1-8
-INTERRUPT I P1-25 07 P1-49
* -ANTICIPATE READY P2-37 *
* DATA BUS 2^7 P2-61 *
* DATA BUS 2^6 P2-62 *
* DATA BUS 2^5 P2-63 *
* DATA BUS 2^4 P2-64 *
* DATA BUS 2^3 P2-65 *
* DATA BUS 2^2 P2-66 *
* DATA BUS 2^1 P2-67 *
* DATA BUS 2^0 P2-68 *
RECEIVE (ANALOG) P1-54 (09 P1-54)
RECEIVE (ANALOG) P1-56 (09 P1-55)
TRANSMIT (ANALOG) P1-50 11 A08A-50
TRANSMIT (ANALOG) P1-52 11 A08A-52
KEYLOCK IN P1-73 10 P1-73
KEYLOCK OUT P1-74 11 A08A-74
NOTES:
* DENOTES BUSSED SIGNALS
( ) ACTIVE WHEN MODEM OPTION PRESENT
⚠ NOT USED IN ASYNC I/F-2 MODULE-TIE POINT ONLY.
REV A
DWG NO 62200815
CROSS REF NO 08
SHEET 11
CODE IDENT 15920
C
ASYNC I/F-2
CONTROL DATA
LOC 08
CROSS REF NO 08


MODEM MODULE (OPTION)
LOCATION 09
08 P1-54 P1-54 RECEIVE (ANALOG)
08 P1-56 P1-55 RECEIVE (ANALOG)
08 P1-38 P1-57 -TRANSMIT DATA (RS)
08 P1-44 P1-58 +DTR (RS)
08 P1-42 P1-68 +RTS (RS)
P1-26 +RING INDICATOR
P1-35 TRANSMIT DATA (TTL)
P1-37 RTS (TTL)
P1-40 OTR (TTL)
89 P1-71 P1-33 +20V (UNREG)
09 P1-76 P1-30 -20V (UNREG)
P1-9 LOCAL LOOP BACK
P1-10 REMOTE LOOP BACK
P1-11 SWITCH COMMON
P1-12 MARK TEST
P1-13 SPACE TEST
P1-27 COUPLER CUT THROUGH
P1-28 SWITCH HOOK
09 P1-14 P1-15 OSCILLATOR IN
TRANSMIT (ANALOG) P1-51 08 P1-50
TRANSMIT (ANALOG) P1-52 08 P1-52
-RECEIVE DATA (RS) P1-56 08 P1-51
RING INDICATOR (RS) P1-61 08 P1-62
DSR (RS) P1-63 08 P1-55
CTS (RS) P1-64 08 P1-53
CON (RS) P1-65 08 P1-49
RING INDICATOR (TTL) P1-16
RECEIVE DATA (TTL) P1-36
CTS (TTL) P1-38
DSR (TTL) P1-39
CON (TTL) P1-41
+12V (REG) P1-34
-12V (REG) P1-29
DATA REQUEST P1-23
OFF HOOK P1-24
OSCILLATOR OUT P1-14 09 P1-15
REV A
DWG NO 62200815
SHEET 12
CODE IDENT 15920
C
CROSS REF NO 09
MODEM MODULE(OPTION)
CONTROL DATA
LOC 09
CROSS REF NO 09

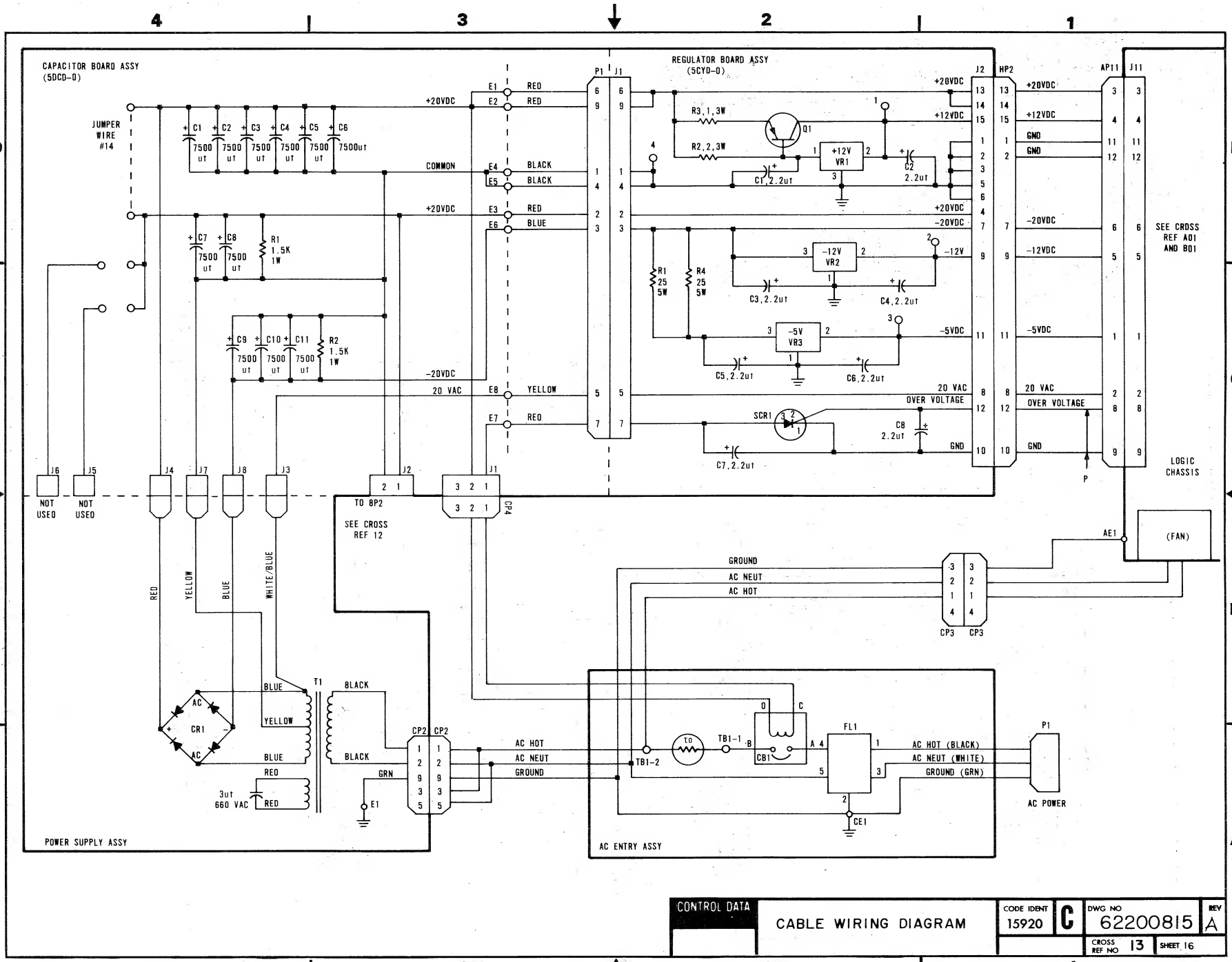

DISPLAY/KYBD I/F MODULE
LOCATION 10
-KYBD STROBE
+KYBD DATA 2^7
+KYBD DATA 2^6
+KYBD DATA 2^5
+KYBD DATA 2^4
+KYBD DATA 2^3
+KYBD DATA 2^2
+KYBD DATA 2^1
+KYBD DATA 2^0
+EXT STATUS A
+EXT STATUS B
CLOCK IN
-TEST RESET
-40/+80 CHAR
40/80 SWITCH GND
+50/-60 HZ
-ODD/+ALL LINES
ODD/ALL SWITCH GND
+SELECT ADD 2^15
+SELECT ADD 2^14
+SELECT ADD 2^13
+SELECT ADD 2^12
+SELECT ADD 2^11
+SELECT ADD 2^10
+SELECT ADD 2^9
+SELECT ADD 2^8
-FULL DIM
+12V
+12V
-12V
-12V
-(POWR+AUTOLOAD)
20 VAC
-CHAN 2 STROBE
-BUS ENABLE 2
-WRITE
-MASTER RESET
-MT3
KEYLOCK IN
KEYLOCK OUT
+VIDEO
VIDEO GND
+HORIZ SYNC
HORIZ SYNC GND
+VERT SYNC
VERT SYNC GND
CLOCK OUT
GND
-INTERRUPT 2
-BUS REQUEST 2
-MEM REQUEST
-READY
+ADDRESS BUS 2^15
+ADDRESS BUS 2^14
+ADDRESS BUS 2^13
+ADDRESS BUS 2^12
+ADDRESS BUS 2^11
+ADDRESS BUS 2^10
+ADDRESS BUS 2^9
+ADDRESS BUS 2^8
+ADDRESS BUS 2^7
+ADDRESS BUS 2^6
+ADDRESS BUS 2^5
+ADDRESS BUS 2^4
+ADDRESS BUS 2^3
+ADDRESS BUS 2^2
+ADDRESS BUS 2^1
+ADDRESS BUS 2^0
+DATA BUS 2^7
+DATA BUS 2^6
+DATA BUS 2^5
+DATA BUS 2^4
+DATA BUS 2^3
+DATA BUS 2^2
+DATA BUS 2^1
+DATA BUS 2^0
NOTES:
1 NOT USED IN ASYNC I/F-2 MODULE-TIE POINT ONLY.
* DENOTES BUSSED SIGNAL.
REV
DWG NO 62200815
SHEET 13
CROSS REF NO 10
CODE IDENT 15920
C
DISPLAY/KYBD I/F MODULE
CONTROL DATA
LOC 10
CROSS REF NO 10



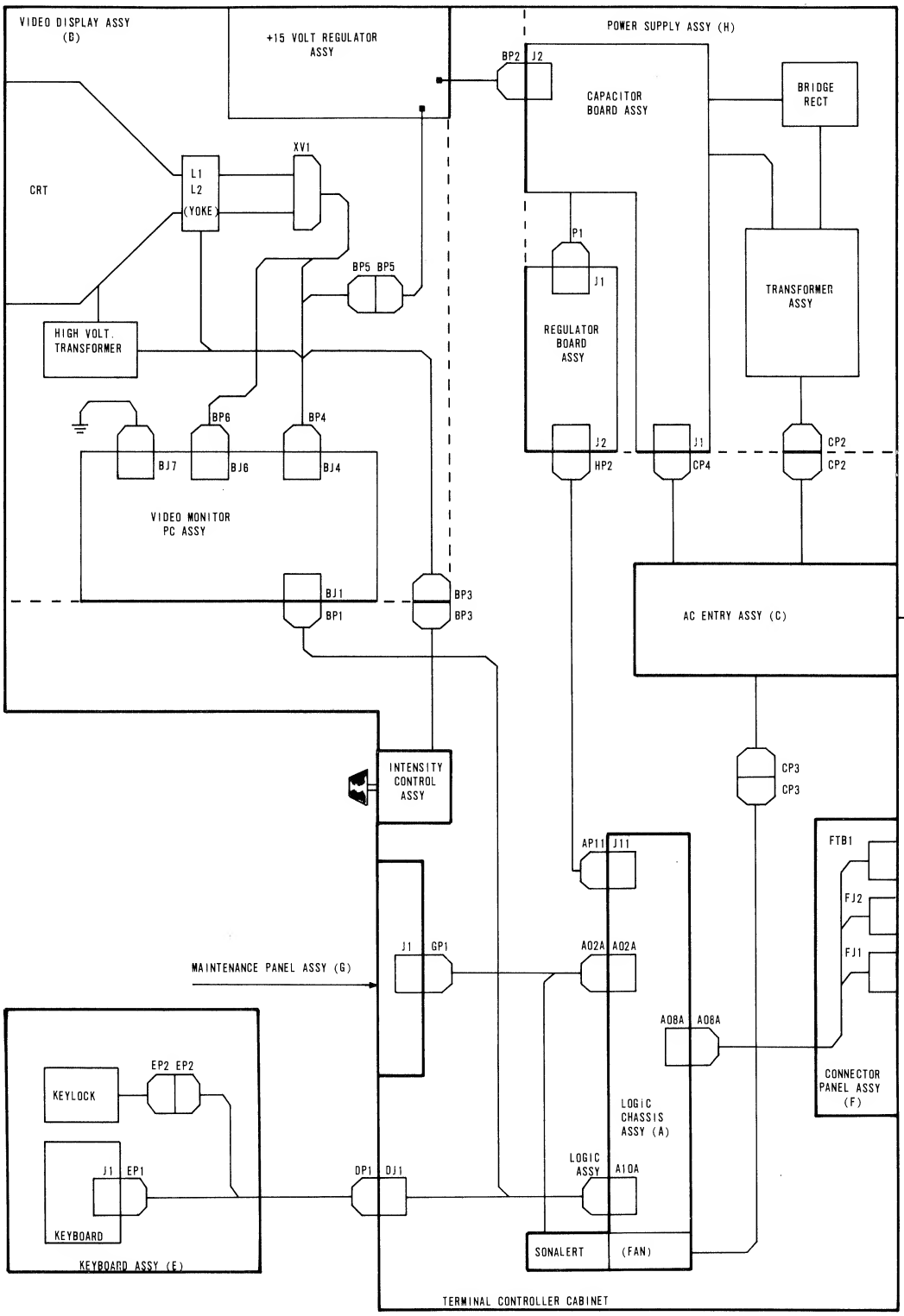
CONTROL DATA	CABLE WIRING DIAGRAM	CODE IDENT 15920	C	DWG NO 62200815	REV A
				CROSS REF NO 11	SHEET 14



CONTROL DATA	CABLE WIRING DIAGRAM	CODE IDENT 15920	C	DWG NO 62200815	REV C
				CROSS REF NO 12	SHEET 15



CONTROL DATA	CABLE WIRING DIAGRAM	CODE IDENT 15920	C	DWG NO 62200815	REV A
				CROSS REF NO 13	SHEET 16



CONTROL DATA

CABLE WIRING DIAGRAM

CODE IDENT 15920 | C | DWG NO 62200815 | REV C

CROSS REF NO 14 | SHEET 17

DIAGRAMS APPLICABLE TO CC617-B

SHEET NO.	CROSS REFERENCE NUMBER	REV	LOGIC DIAGRAM TITLE
1		A	MODULE INTERCONNECTION DIAGRAM CONTROL SHEET
2		A	BUSSED SIGNAL CHART
3	A01	A	+5V REGULATOR (SLAVE, OPTION)
4	B01	A	+5V REGULATOR (MASTER)
5	02	A	MAINT PANEL I/F CONNECTOR
6	03	A	PROGRAM MEMORY MODULE
7	06	A	PROCESSOR
8	07	A	STIC
9	08	A	ASYNC I/F-2
10	09	A	MODEM MODULE (OPTION)
11	10	A	DISPLAY/KYBD I/F MODULE
12	11	A	CABLE WIRING DIAGRAM
13	12	A	CABLE WIRING DIAGRAM
14	13	A	CABLE WIRING DIAGRAM
15	14	A	CABLE WIRING DIAGRAM

SHEET REVISION STATUS

REVISION RECORD						
REV	CO	DESCRIPTION	DRFT	DATE	CHKD	APP
—	—	RELEASED CLASS 'A'	MMD	6-28-76	WJH	
A	10842-54	RELEASED CLASS A	—	8-18-76	—	M.C.T.

SHEET NO.	CROSS REFERENCE NUMBER	REV	LOGIC DIAGRAM TITLE

NOTES:
FOR LOGIC CHIP INFORMATION SEE DRAWING (02297000) KEY TO SYMBOLS.

REFERENCE DRAWING

COMPONENTS, EXCEPT AS NOTED			
	TOLERANCE	VALUE	RATING
RES			
CAP			

FIRST USED ON	CC617B	
DWN	MM DROBINSKI	6-28-76
CHKD	W.J HERMAN	7-2-76
ENGR	[signature]	7-23-76
MFG	[signature]	8-17-76
APPR	[signature]	8/16/76

TITLE
MODULE INTERCONNECTION DIAGRAM
CONTROL SHEET

CODE IDENT		DRAWING NO
15920	C	62200826

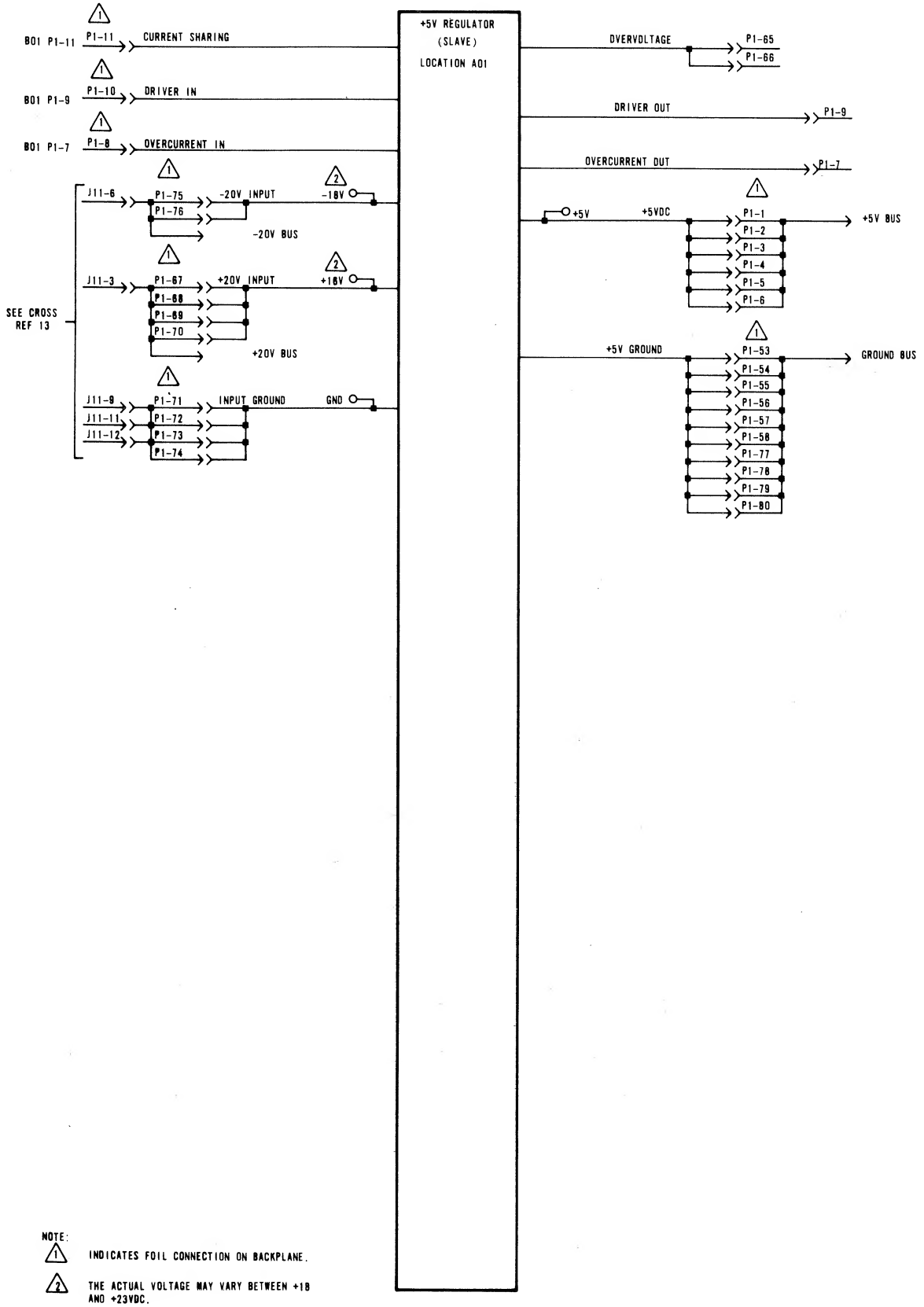
SCALE	CROSS REF NO	SHEET 1 OF 15

MODULE NAME AND LOCATION

BUSSED SIGNAL NAME AND PIN NUMBER		02 MAINT PANEL I/F CONNECTOR	03 PROGRAM MEMORY (RAM 0000-1FFF) (ROM E000-FFFF)	04 SPARE	05 SPARE	06 PROCESSOR	07 STIC	08 ASYNC I/F-2	09 MODEM	10 DISPLAY/KYBD I/F MODULE
+5V	P1-1,2,3,4 P2-1,2,3,4	X	X			X	X	X	X	X
GND	P1-77,78,79,80 P2-77,78,79,80	X	X			X	X	X	X	X
+20V	P1-71,72 P2-71,72					X		X	X	
-20V	P1-75,76 P2-75,76					X		X	X	
-PROCESSOR ON BUS	P2-8					X				
-INTA	P2-9					X				
-CONTROL PANEL STROBE	P2-10					X				
-HLDA	P2-11					X				
-SYNC	P2-12					X				
-STEP	P2-13					X				
-HOLD	P2-14					X				
-ENABLE CONTROL PANEL STROBE	P2-15					X				
-FETCH	P2-16					X				
-MT5	P2-17					X				
-MT4	P2-20					X				
-MT3	P2-18					X				X
-MT2	P2-19					X				
-MT1	P2-21					X	X			
+2 MHZ	P2-22		X			X	X	X		
-ANTICIPATE READY	P2-37		X			X	X	X		
-MASTER RESET TO PROCESSOR	P2-38					X	X			
-READY	P2-39		X			X	X			X
+10 MHZ	P2-40		X			X				
-MEMORY REQUEST	P2-41		X			X	X			X
-I/O STROBE	P2-42					X				
-WRITE	P2-43		X			X	X	X		X
-MASTER RESET FROM PROC	P2-44		X			X	X	X		X
+ADDRESS BUS 2^{15}	P2-45		X			X	X			X
+ADDRESS BUS 2^{14}	P2-46		X			X	X			X
+ADDRESS BUS 2^{13}	P2-47		X			X	X			X
+ADDRESS BUS 2^{12}	P2-48		X			X	X			X
+ADDRESS BUS 2^{11}	P2-49		X			X				X
+ADDRESS BUS 2^{10}	P2-50		X			X				X
+ADDRESS BUS 2^{9}	P2-51		X			X				X
+ADDRESS BUS 2^{8}	P2-52		X			X				X
+ADDRESS BUS 2^{7}	P2-53		X			X				X
+ADDRESS BUS 2^{6}	P2-54		X			X				X
+ADDRESS BUS 2^{5}	P2-55		X			X				X
+ADDRESS BUS 2^{4}	P2-56		X			X	X			X
+ADDRESS BUS 2^{3}	P2-57		X			X				X
+ADDRESS BUS 2^{2}	P2-58		X			X	X	X		X
+ADDRESS BUS 2^{1}	P2-59		X			X	X	X		X
+ADDRESS BUS 2^{0}	P2-60		X			X	X	X		X
+DATA BUS 2^{7}	P2-61		X			X	X	X		X
+DATA BUS 2^{6}	P2-62		X			X	X	X		X
+DATA BUS 2^{5}	P2-63		X			X	X	X		X
+DATA BUS 2^{4}	P2-64		X			X	X	X		X
+DATA BUS 2^{3}	P2-65		X			X	X	X		X
+DATA BUS 2^{2}	P2-66		X			X	X	X		X
+DATA BUS 2^{1}	P2-67		X			X	X	X		X
+DATA BUS 2^{0}	P2-68		X			X	X	X		X

NOTE: THESE SIGNALS ARE PRESENT ON LOCATIONS 02 THROUGH 10
THE X INDICATES WHERE THE SIGNALS ARE ACTUALLY USED.

REV A
DWG NO 62200826
SHEET 2
CROSS REF NO
CODE IDENT 15920
C
BUSSED SIGNAL CHART
CONTROL DATA
CROSS REF NO

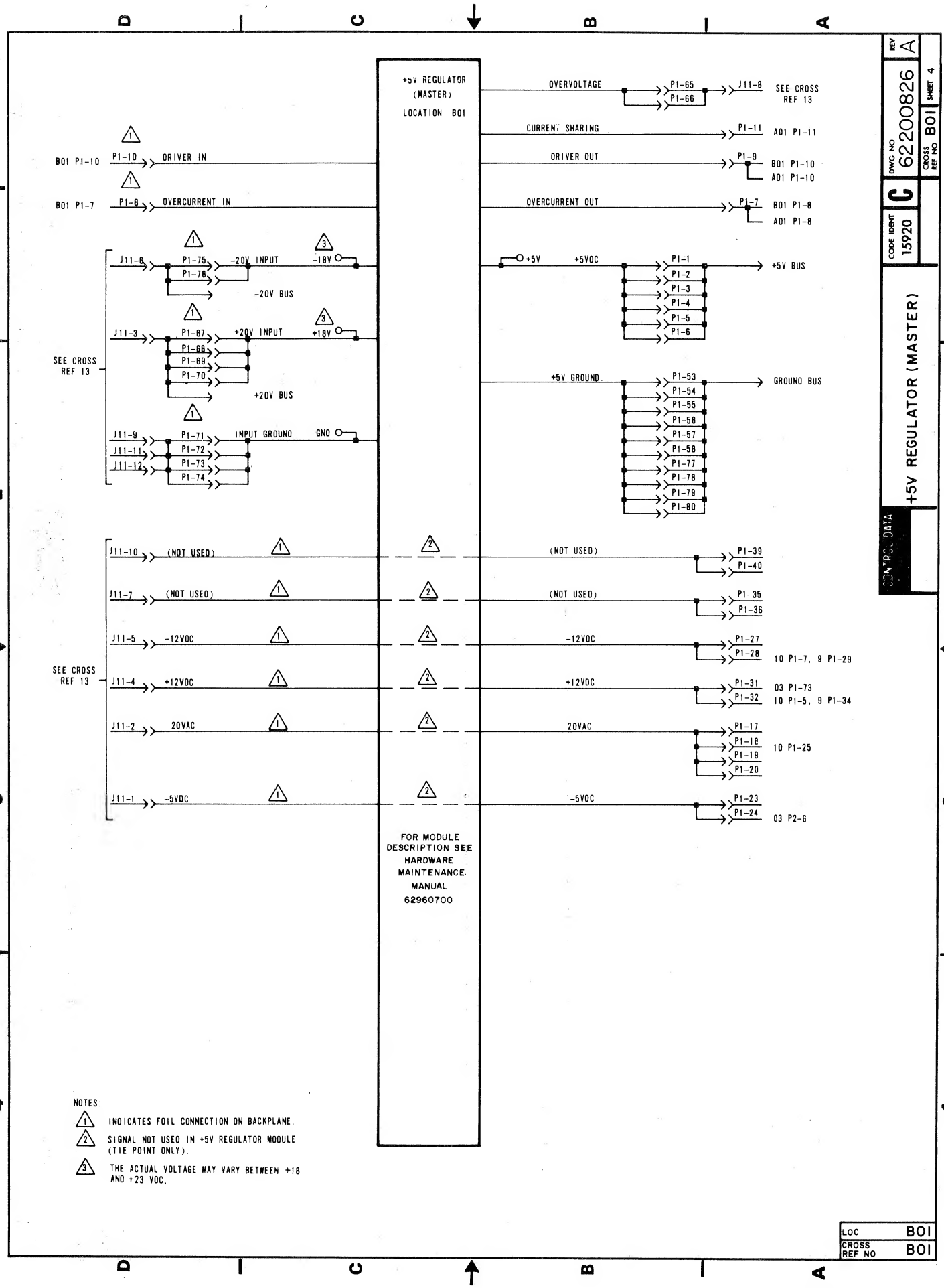


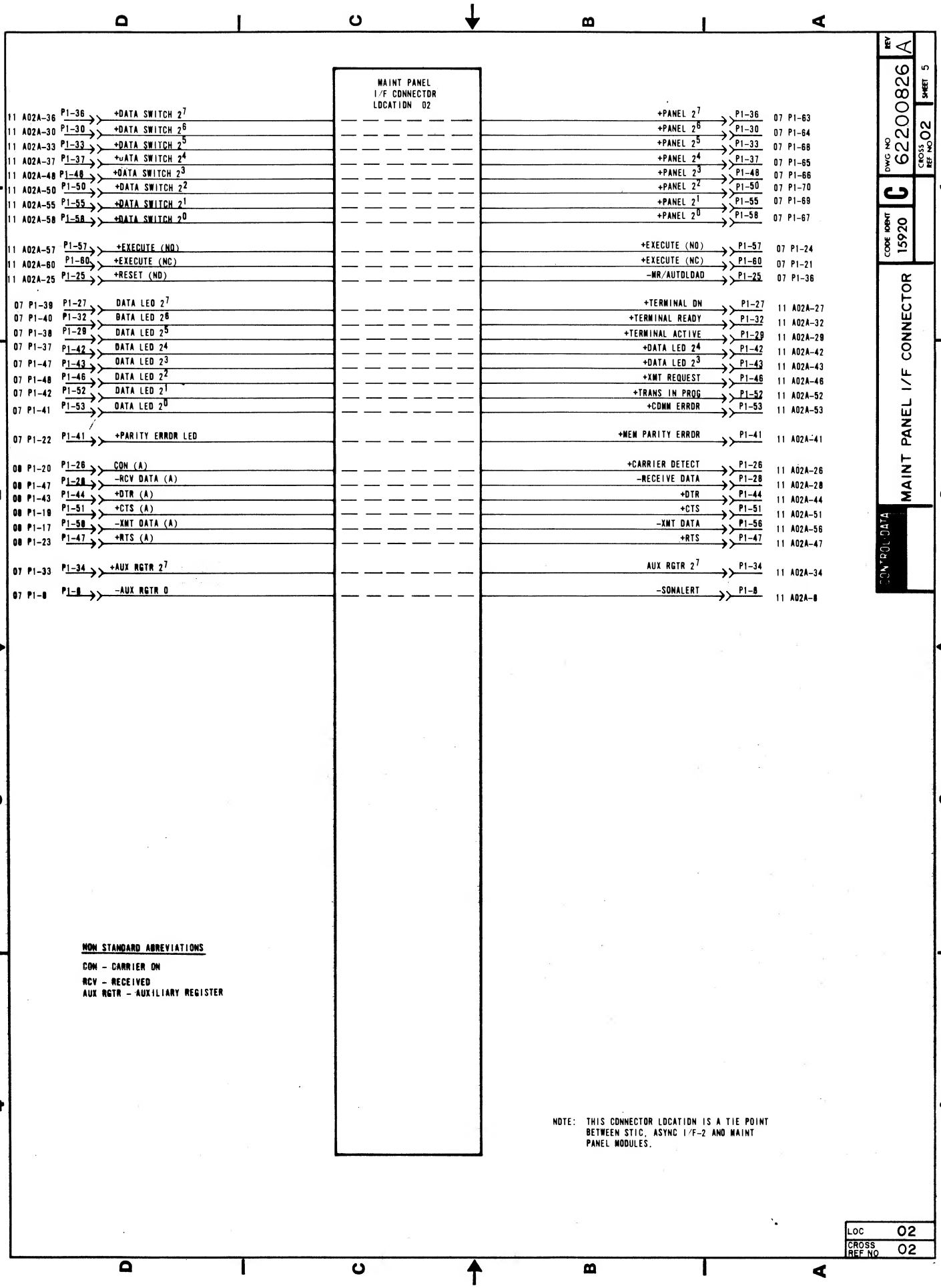
NOTE:
1. INDICATES FOIL CONNECTION ON BACKPLANE.
2. THE ACTUAL VOLTAGE MAY VARY BETWEEN +18 AND +23VDC.

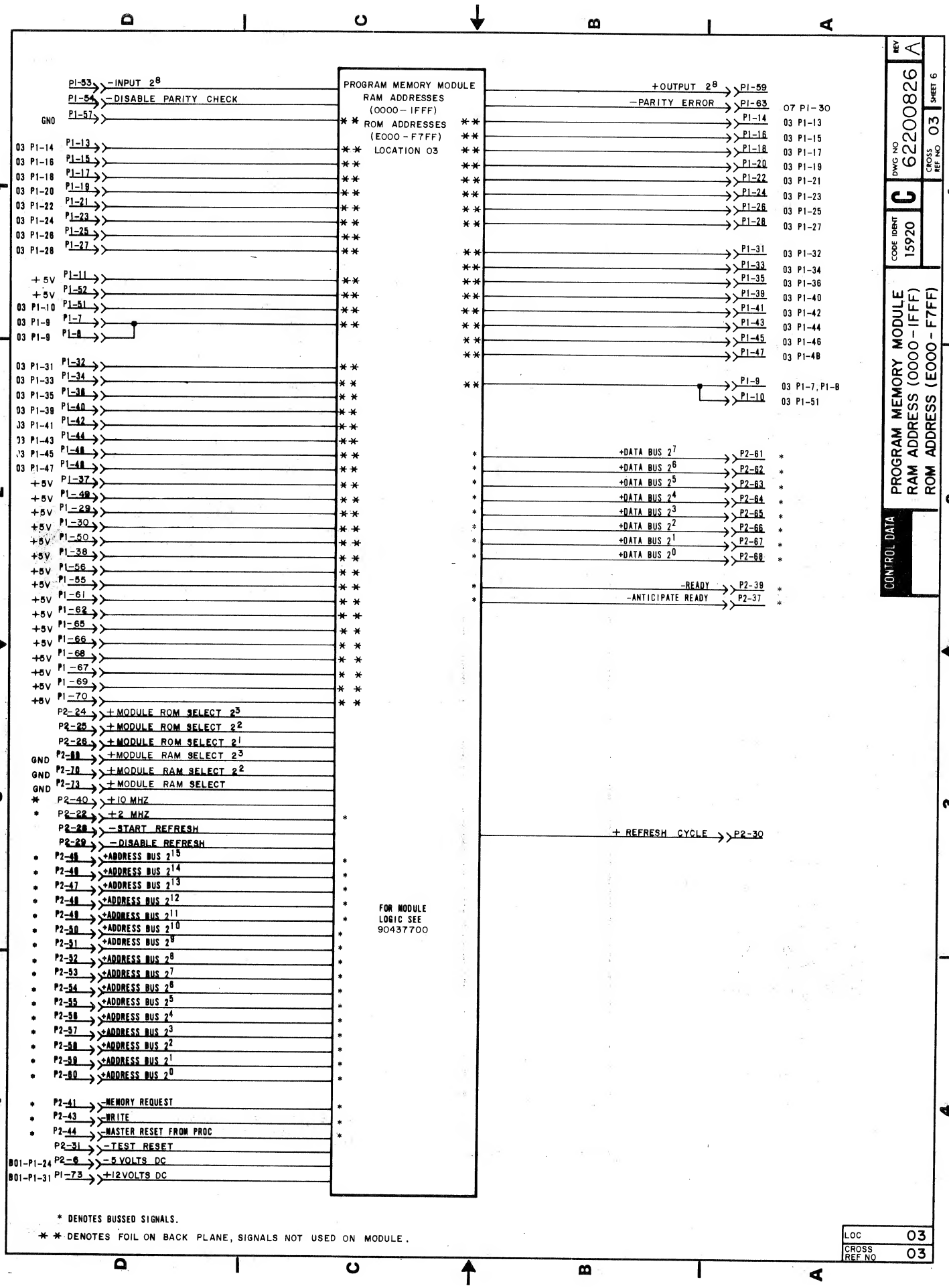
Note: The +5-V regulator depicted on this diagram is not used.

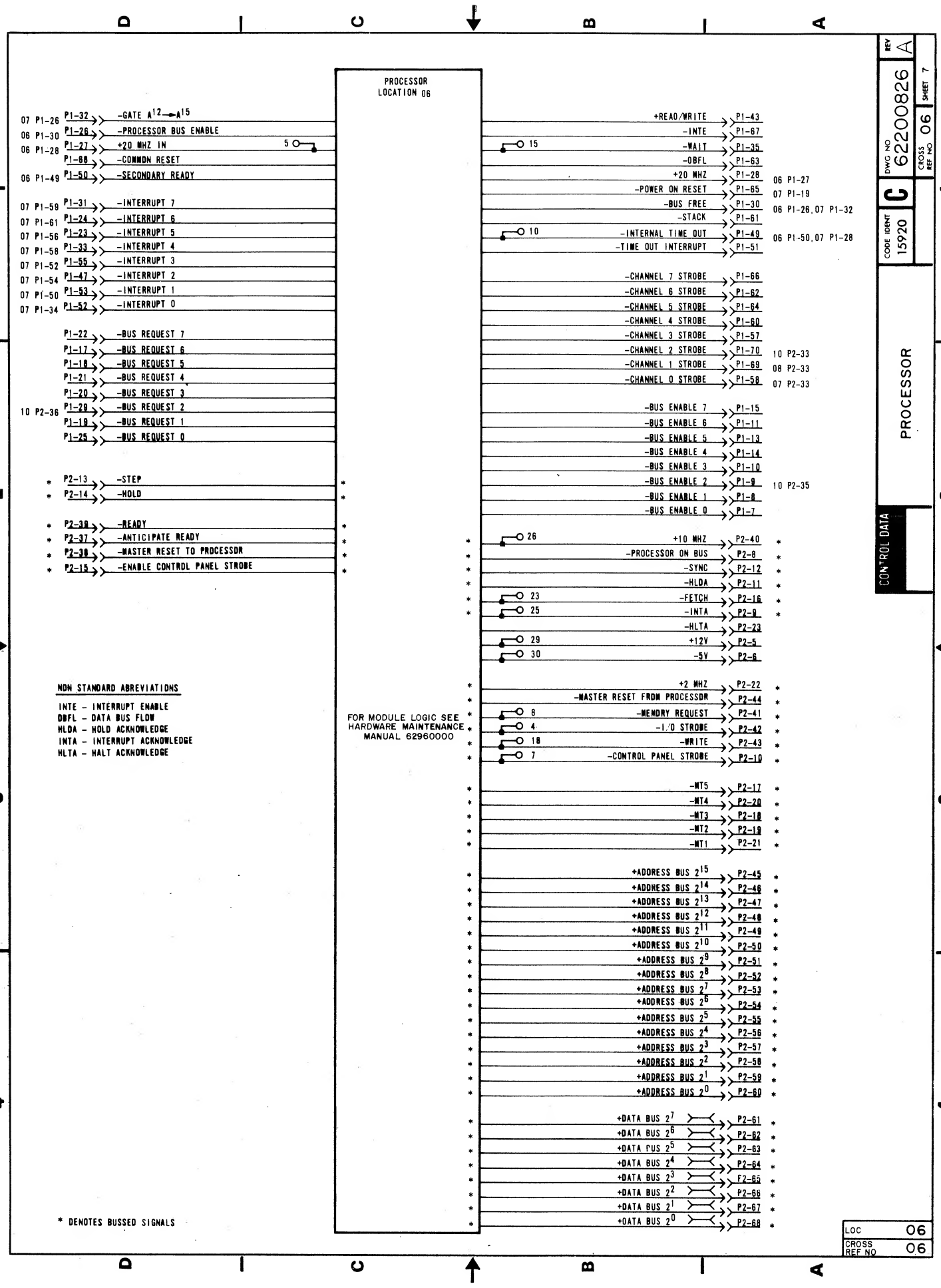
REV A
DWG NO 62200826
SHEET 3
CROSS REF NO A01
CODE IDENT 15920
C
+5V REGULATOR (SLAVE, OPTION)
CONTROL DATA

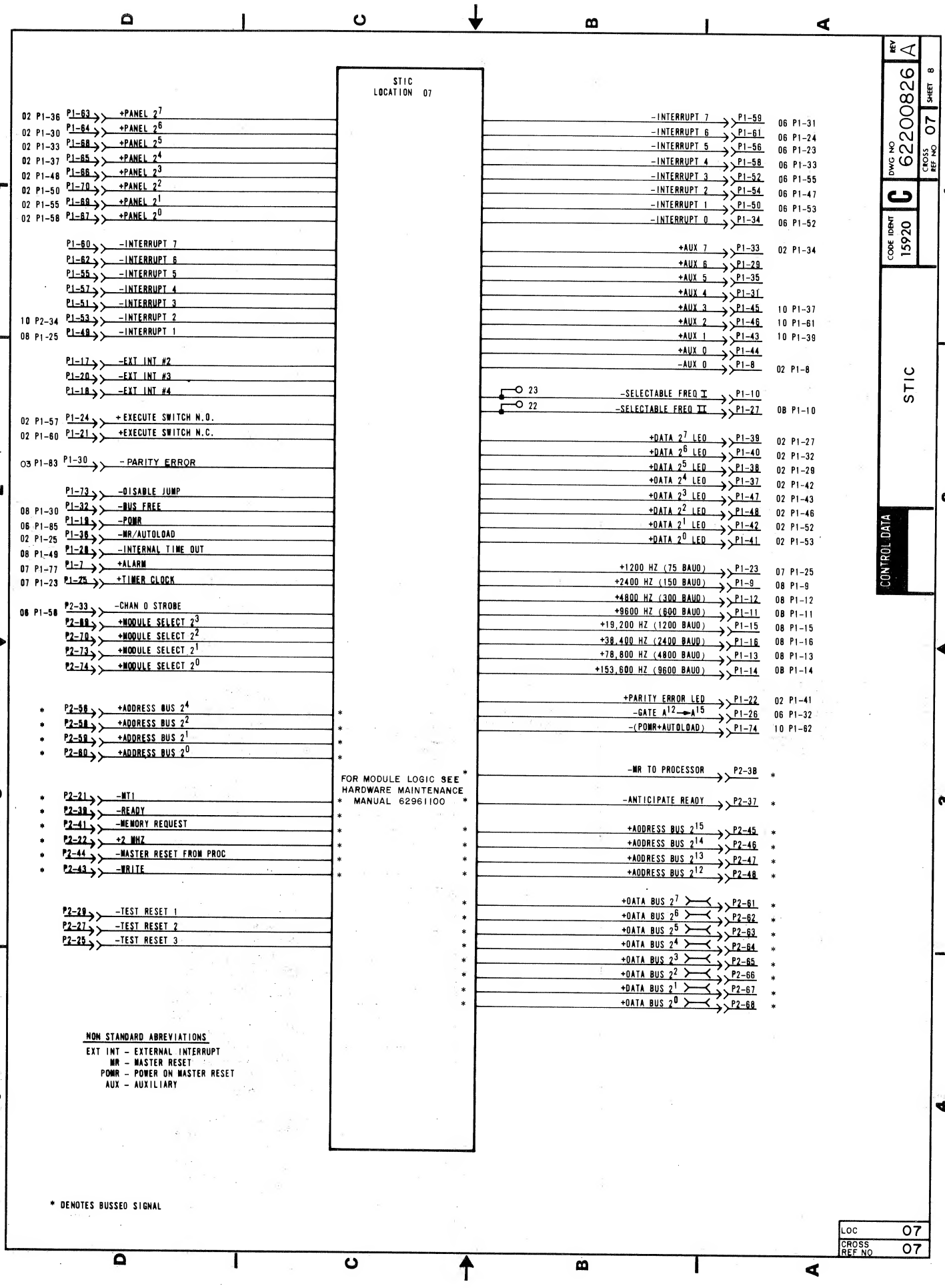
LOC A01
CROSS REF NO A01

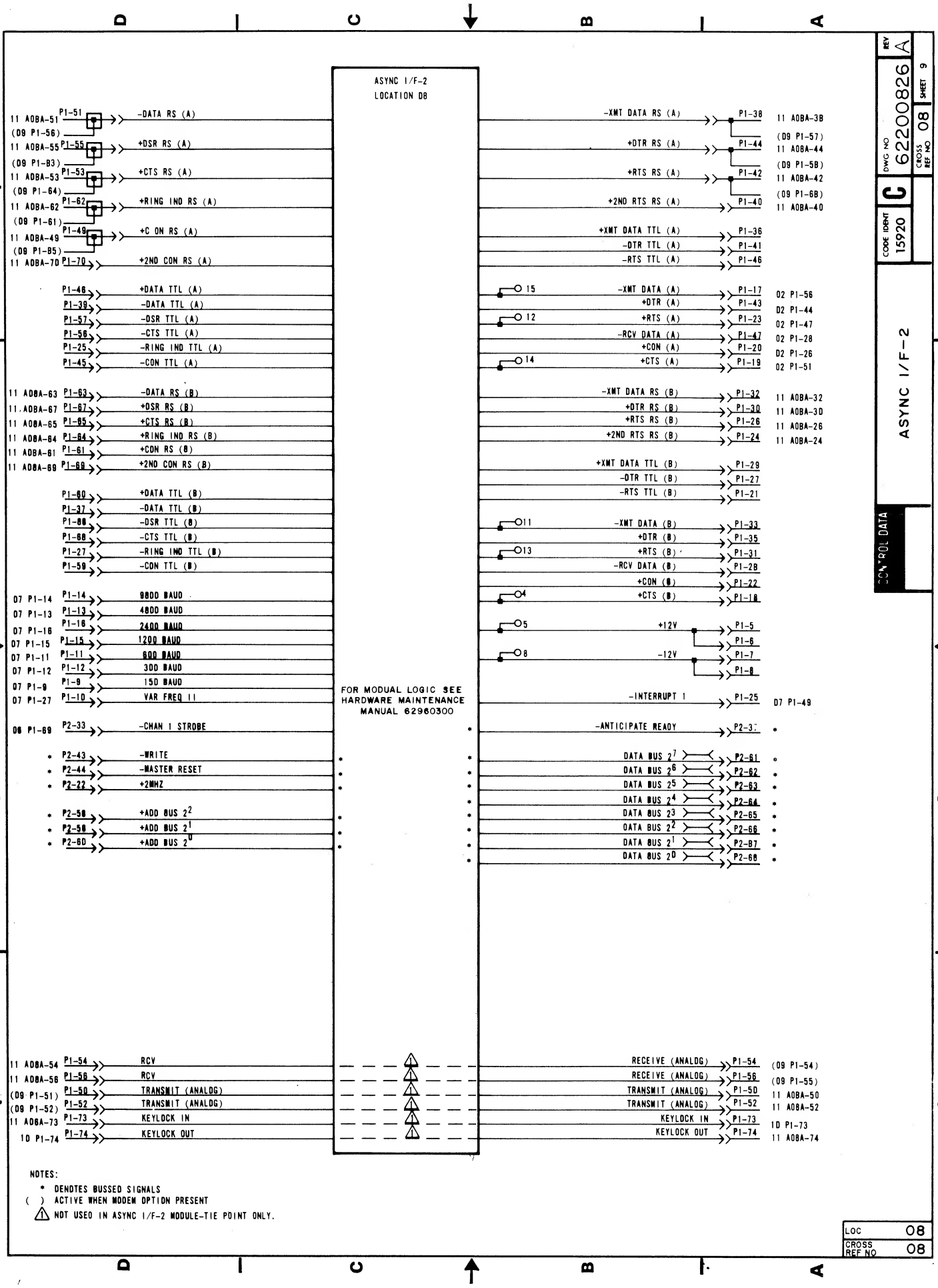

+5V REGULATOR (MASTER) LOCATION B01
B01 P1-10 P1-10 DRIVER IN
B01 P1-7 P1-8 OVERCURRENT IN
SEE CROSS REF 13
J11-6 P1-75 P1-76 -20V INPUT -18V
-20V BUS
J11-3 P1-67 P1-68 P1-69 P1-70 +20V INPUT +18V
+20V BUS
J11-9 J11-11 J11-12 P1-71 P1-72 P1-73 P1-74 INPUT GROUND GND
J11-10 (NOT USED)
J11-7 (NOT USED)
J11-5 -12VDC
J11-4 +12VDC
J11-2 20VAC
J11-1 -5VDC
FOR MODULE DESCRIPTION SEE HARDWARE MAINTENANCE MANUAL 62960700
OVERVOLTAGE P1-65 P1-66 J11-8 SEE CROSS REF 13
CURRENT SHARING P1-11 A01 P1-11
DRIVER OUT P1-9 B01 P1-10 A01 P1-10
OVERCURRENT OUT P1-7 B01 P1-8 A01 P1-8
+5V +5VDC P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 +5V BUS
+5V GROUND P1-53 P1-54 P1-55 P1-56 P1-57 P1-58 P1-77 P1-78 P1-79 P1-80 GROUND BUS
(NOT USED) P1-39 P1-40
(NOT USED) P1-35 P1-36
-12VDC P1-27 P1-28 10 P1-7, 9 P1-29
+12VDC P1-31 03 P1-73 P1-32 10 P1-5, 9 P1-34
20VAC P1-17 P1-18 10 P1-25 P1-19 P1-20
-5VDC P1-23 P1-24 03 P2-6
NOTES:
1 INDICATES FOIL CONNECTION ON BACKPLANE.
2 SIGNAL NOT USED IN +5V REGULATOR MODULE (TIE POINT ONLY).
3 THE ACTUAL VOLTAGE MAY VARY BETWEEN +18 AND +23 VDC.
REV A
DWG NO 62200826
SHEET 4
CROSS REF NO B01
CODE IDENT 15920
C
+5V REGULATOR (MASTER)
CONTROL DATA
LOC B01
CROSS REF NO B01

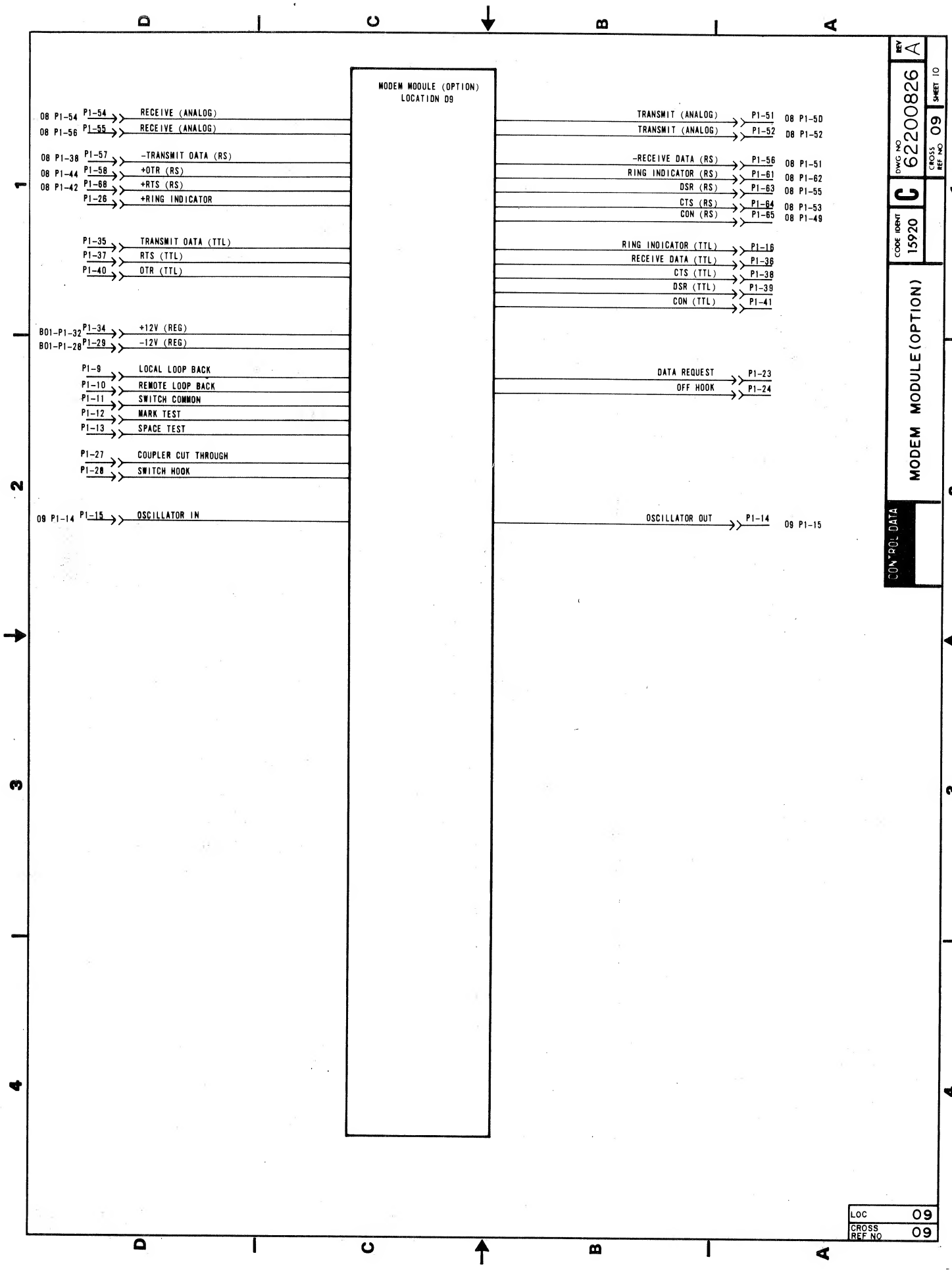

MAINT PANEL I/F CONNECTOR LOCATION 02
11 A02A-36 P1-36 +DATA SWITCH 2^7
11 A02A-30 P1-30 +DATA SWITCH 2^6
11 A02A-33 P1-33 +DATA SWITCH 2^5
11 A02A-37 P1-37 +DATA SWITCH 2^4
11 A02A-48 P1-48 +DATA SWITCH 2^3
11 A02A-50 P1-50 +DATA SWITCH 2^2
11 A02A-55 P1-55 +DATA SWITCH 2^1
11 A02A-58 P1-58 +DATA SWITCH 2^0
11 A02A-57 P1-57 +EXECUTE (NO)
11 A02A-60 P1-60 +EXECUTE (NC)
11 A02A-25 P1-25 +RESET (NO)
07 P1-39 P1-27 DATA LED 2^7
07 P1-40 P1-32 DATA LED 2^6
07 P1-38 P1-29 DATA LED 2^5
07 P1-37 P1-42 DATA LED 2^4
07 P1-47 P1-43 DATA LED 2^3
07 P1-48 P1-46 DATA LED 2^2
07 P1-42 P1-52 DATA LED 2^1
07 P1-41 P1-53 DATA LED 2^0
07 P1-22 P1-41 +PARITY ERROR LED
08 P1-20 P1-26 CON (A)
08 P1-47 P1-28 -RCV DATA (A)
08 P1-43 P1-44 +DTR (A)
08 P1-19 P1-51 +CTS (A)
08 P1-17 P1-56 -XMT DATA (A)
08 P1-23 P1-47 +RTS (A)
07 P1-33 P1-34 +AUX RGTR 2^7
07 P1-8 P1-8 -AUX RGTR 0
+PANEL 2^7 P1-36 07 P1-63
+PANEL 2^6 P1-30 07 P1-64
+PANEL 2^5 P1-33 07 P1-68
+PANEL 2^4 P1-37 07 P1-65
+PANEL 2^3 P1-48 07 P1-66
+PANEL 2^2 P1-50 07 P1-70
+PANEL 2^1 P1-55 07 P1-69
+PANEL 2^0 P1-58 07 P1-67
+EXECUTE (NO) P1-57 07 P1-24
+EXECUTE (NC) P1-60 07 P1-21
-MR/AUTOLOAD P1-25 07 P1-36
+TERMINAL ON P1-27 11 A02A-27
+TERMINAL READY P1-32 11 A02A-32
+TERMINAL ACTIVE P1-29 11 A02A-29
+DATA LED 2^4 P1-42 11 A02A-42
+DATA LED 2^3 P1-43 11 A02A-43
+XMT REQUEST P1-46 11 A02A-46
+TRANS IN PROG P1-52 11 A02A-52
+COMM ERROR P1-53 11 A02A-53
+MEM PARITY ERROR P1-41 11 A02A-41
+CARRIER DETECT P1-26 11 A02A-26
-RECEIVE DATA P1-28 11 A02A-28
+DTR P1-44 11 A02A-44
+CTS P1-51 11 A02A-51
-XMT DATA P1-56 11 A02A-56
+RTS P1-47 11 A02A-47
AUX RGTR 2^7 P1-34 11 A02A-34
-SONALERT P1-8 11 A02A-8
NON STANDARD ABREVIATIONS
CON - CARRIER ON
RCV - RECEIVED
AUX RGTR - AUXILIARY REGISTER
NOTE: THIS CONNECTOR LOCATION IS A TIE POINT BETWEEN STIC, ASYNC I/F-2 AND MAINT PANEL MODULES.
REV A
DWG NO 62200826
SHEET 5
CROSS REF NO 02
CODE IDENT 15920
C
MAINT PANEL I/F CONNECTOR
CONTROL DATA
LOC 02
CROSS REF NO 02

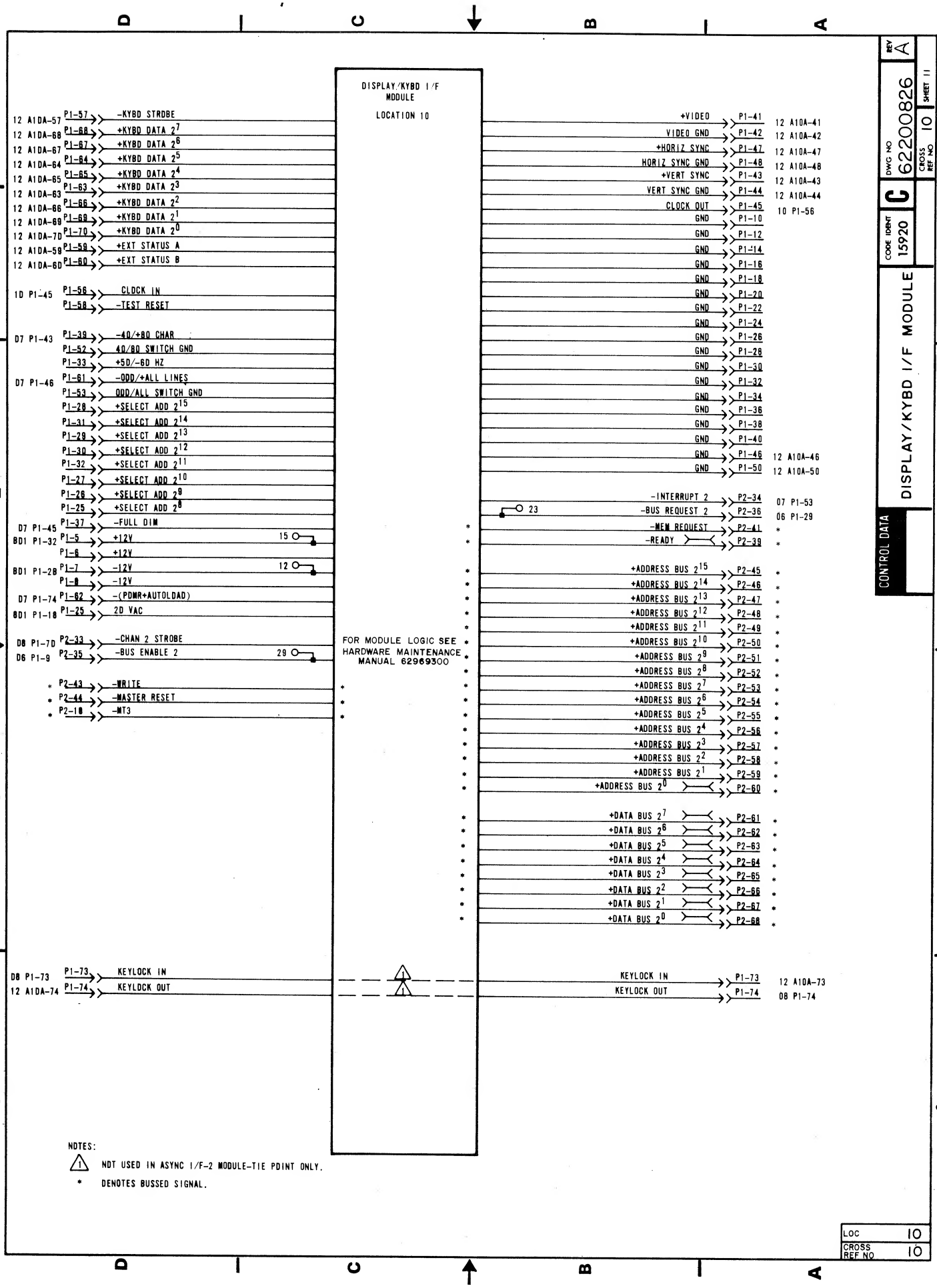

PROGRAM MEMORY MODULE
RAM ADDRESSES
(0000 - 1FFF)
ROM ADDRESSES
(E000 - F7FF)
LOCATION 03
FOR MODULE LOGIC SEE 90437700
P1-53 -INPUT 2^8
P1-54 -DISABLE PARITY CHECK
P1-57 GND
P1-13 03 P1-14
P1-15 03 P1-16
P1-17 03 P1-18
P1-19 03 P1-20
P1-21 03 P1-22
P1-23 03 P1-24
P1-25 03 P1-26
P1-27 03 P1-28
P1-11 +5V
P1-52 +5V
P1-51 03 P1-10
P1-7 03 P1-9
P1-8 03 P1-9
P1-32 03 P1-31
P1-34 03 P1-33
P1-36 03 P1-35
P1-40 03 P1-39
P1-42 03 P1-41
P1-44 03 P1-43
P1-46 03 P1-45
P1-48 03 P1-47
P1-37 +5V
P1-49 +5V
P1-29 +5V
P1-30 +5V
P1-50 +5V
P1-38 +5V
P1-56 +5V
P1-55 +5V
P1-61 +5V
P1-62 +5V
P1-65 +5V
P1-66 +5V
P1-68 +5V
P1-67 +5V
P1-69 +5V
P1-70 +5V
P2-24 +MODULE ROM SELECT 2^3
P2-25 +MODULE ROM SELECT 2^2
P2-26 +MODULE ROM SELECT 2^1
P2-89 GND +MODULE RAM SELECT 2^3
P2-70 GND +MODULE RAM SELECT 2^2
P2-73 GND +MODULE RAM SELECT
P2-40 * +10 MHZ
P2-22 * +2 MHZ
P2-28 -START REFRESH
P2-29 -DISABLE REFRESH
P2-45 * +ADDRESS BUS 2^15
P2-46 * +ADDRESS BUS 2^14
P2-47 * +ADDRESS BUS 2^13
P2-48 * +ADDRESS BUS 2^12
P2-49 * +ADDRESS BUS 2^11
P2-50 * +ADDRESS BUS 2^10
P2-51 * +ADDRESS BUS 2^9
P2-52 * +ADDRESS BUS 2^8
P2-53 * +ADDRESS BUS 2^7
P2-54 * +ADDRESS BUS 2^6
P2-55 * +ADDRESS BUS 2^5
P2-58 * +ADDRESS BUS 2^4
P2-57 * +ADDRESS BUS 2^3
P2-58 * +ADDRESS BUS 2^2
P2-59 * +ADDRESS BUS 2^1
P2-60 * +ADDRESS BUS 2^0
P2-41 * -MEMORY REQUEST
P2-43 * -WRITE
P2-44 * -MASTER RESET FROM PROC
P2-31 -TEST RESET
B01-P1-24 P2-6 -5 VOLTS DC
B01-P1-31 P1-73 +12 VOLTS DC
+OUTPUT 2^8 P1-59
-PARITY ERROR P1-63 07 P1-30
P1-14 03 P1-13
P1-16 03 P1-15
P1-18 03 P1-17
P1-20 03 P1-19
P1-22 03 P1-21
P1-24 03 P1-23
P1-26 03 P1-25
P1-28 03 P1-27
P1-31 03 P1-32
P1-33 03 P1-34
P1-35 03 P1-36
P1-39 03 P1-40
P1-41 03 P1-42
P1-43 03 P1-44
P1-45 03 P1-46
P1-47 03 P1-48
P1-9 03 P1-7, P1-8
P1-10 03 P1-51
+DATA BUS 2^7 P2-61 *
+DATA BUS 2^6 P2-62 *
+DATA BUS 2^5 P2-63 *
+DATA BUS 2^4 P2-64 *
+DATA BUS 2^3 P2-65 *
+DATA BUS 2^2 P2-66 *
+DATA BUS 2^1 P2-67 *
+DATA BUS 2^0 P2-68 *
-READY P2-39 *
-ANTICIPATE READY P2-37 *
+ REFRESH CYCLE P2-30
* DENOTES BUSSED SIGNALS.
* * DENOTES FOIL ON BACK PLANE, SIGNALS NOT USED ON MODULE.
REV A
DWG NO 62200826
SHEET 6
CROSS REF NO 03
CODE IDENT 15920
C
PROGRAM MEMORY MODULE
RAM ADDRESS (0000 - 1FFF)
ROM ADDRESS (E000 - F7FF)
CONTROL DATA
LOC 03
CROSS REF NO 03

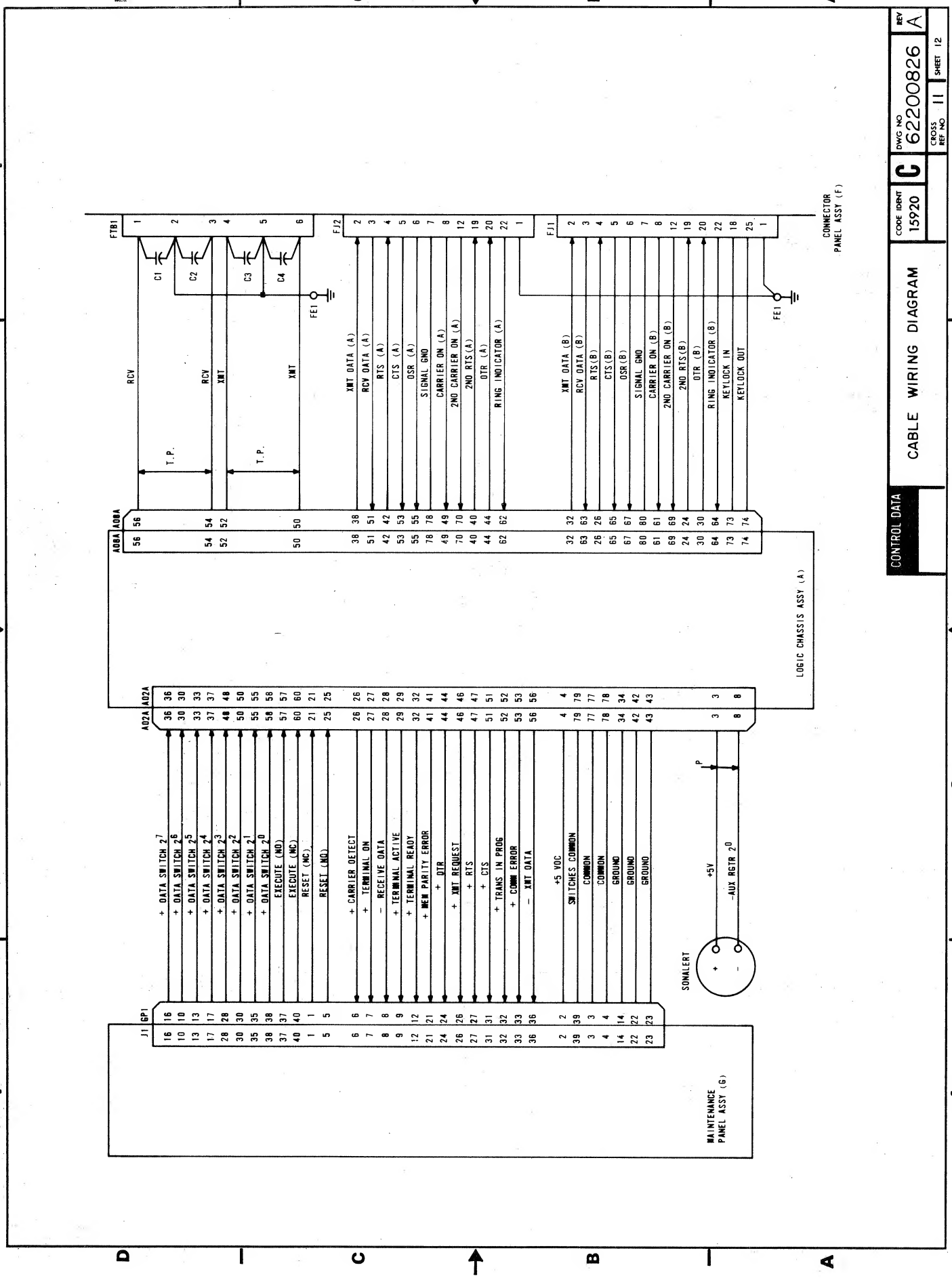

PROCESSOR
LOCATION 06
07 P1-26 P1-32 -GATE A12→A15
06 P1-30 P1-26 -PROCESSOR BUS ENABLE
06 P1-28 P1-27 +20 MHZ IN
P1-60 -COMMON RESET
06 P1-49 P1-50 -SECONDARY READY
07 P1-59 P1-31 -INTERRUPT 7
07 P1-61 P1-24 -INTERRUPT 6
07 P1-56 P1-23 -INTERRUPT 5
07 P1-58 P1-33 -INTERRUPT 4
07 P1-52 P1-55 -INTERRUPT 3
07 P1-54 P1-47 -INTERRUPT 2
07 P1-50 P1-53 -INTERRUPT 1
07 P1-34 P1-52 -INTERRUPT 0
P1-22 -BUS REQUEST 7
P1-17 -BUS REQUEST 6
P1-18 -BUS REQUEST 5
P1-21 -BUS REQUEST 4
P1-20 -BUS REQUEST 3
10 P2-36 P1-28 -BUS REQUEST 2
P1-19 -BUS REQUEST 1
P1-25 -BUS REQUEST 0
* P2-13 -STEP
* P2-14 -HOLD
* P2-39 -READY
* P2-37 -ANTICIPATE READY
* P2-38 -MASTER RESET TO PROCESSOR
* P2-15 -ENABLE CONTROL PANEL STROBE
+READ/WRITE P1-43
-INTE P1-67
15 -WAIT P1-35
-DBFL P1-63
+20 MHZ P1-28
-POWER ON RESET P1-65 07 P1-19
-BUS FREE P1-30 06 P1-26, 07 P1-32
-STACK P1-61
10 -INTERNAL TIME OUT P1-49 06 P1-50, 07 P1-28
-TIME OUT INTERRUPT P1-51
-CHANNEL 7 STROBE P1-66
-CHANNEL 6 STROBE P1-62
-CHANNEL 5 STROBE P1-64
-CHANNEL 4 STROBE P1-60
-CHANNEL 3 STROBE P1-57
-CHANNEL 2 STROBE P1-70 10 P2-33
-CHANNEL 1 STROBE P1-69 08 P2-33
-CHANNEL 0 STROBE P1-58 07 P2-33
-BUS ENABLE 7 P1-15
-BUS ENABLE 6 P1-11
-BUS ENABLE 5 P1-13
-BUS ENABLE 4 P1-14
-BUS ENABLE 3 P1-10
-BUS ENABLE 2 P1-9 10 P2-35
-BUS ENABLE 1 P1-8
-BUS ENABLE 0 P1-7
26 +10 MHZ P2-40
-PROCESSOR ON BUS P2-8
-SYNC P2-12
-HLDA P2-11
23 -FETCH P2-16
25 -INTA P2-9
-HLTA P2-23
29 +12V P2-5
30 -5V P2-6
+2 MHZ P2-22
-MASTER RESET FROM PROCESSOR P2-44
8 -MEMORY REQUEST P2-41
4 -I/O STROBE P2-42
18 -WRITE P2-43
7 -CONTROL PANEL STROBE P2-10
-MT5 P2-17
-MT4 P2-20
-MT3 P2-18
-MT2 P2-19
-MT1 P2-21
+ADDRESS BUS 2^15 P2-45
+ADDRESS BUS 2^14 P2-46
+ADDRESS BUS 2^13 P2-47
+ADDRESS BUS 2^12 P2-48
+ADDRESS BUS 2^11 P2-49
+ADDRESS BUS 2^10 P2-50
+ADDRESS BUS 2^9 P2-51
+ADDRESS BUS 2^8 P2-52
+ADDRESS BUS 2^7 P2-53
+ADDRESS BUS 2^6 P2-54
+ADDRESS BUS 2^5 P2-55
+ADDRESS BUS 2^4 P2-56
+ADDRESS BUS 2^3 P2-57
+ADDRESS BUS 2^2 P2-58
+ADDRESS BUS 2^1 P2-59
+ADDRESS BUS 2^0 P2-60
+DATA BUS 2^7 P2-61
+DATA BUS 2^6 P2-62
+DATA BUS 2^5 P2-63
+DATA BUS 2^4 P2-64
+DATA BUS 2^3 P2-65
+DATA BUS 2^2 P2-66
+DATA BUS 2^1 P2-67
+DATA BUS 2^0 P2-68
NON STANDARD ABREVIATIONS
INTE - INTERRUPT ENABLE
DBFL - DATA BUS FLOW
HLDA - HOLD ACKNOWLEDGE
INTA - INTERRUPT ACKNOWLEDGE
HLTA - HALT ACKNOWLEDGE
FOR MODULE LOGIC SEE HARDWARE MAINTENANCE MANUAL 62960000
* DENOTES BUSSED SIGNALS
REV A
DWG NO 62200826
SHEET 7
CROSS REF NO 06
CODE IDENT 15920
C
PROCESSOR
CONTROL DATA
LOC 06
CROSS REF NO 06

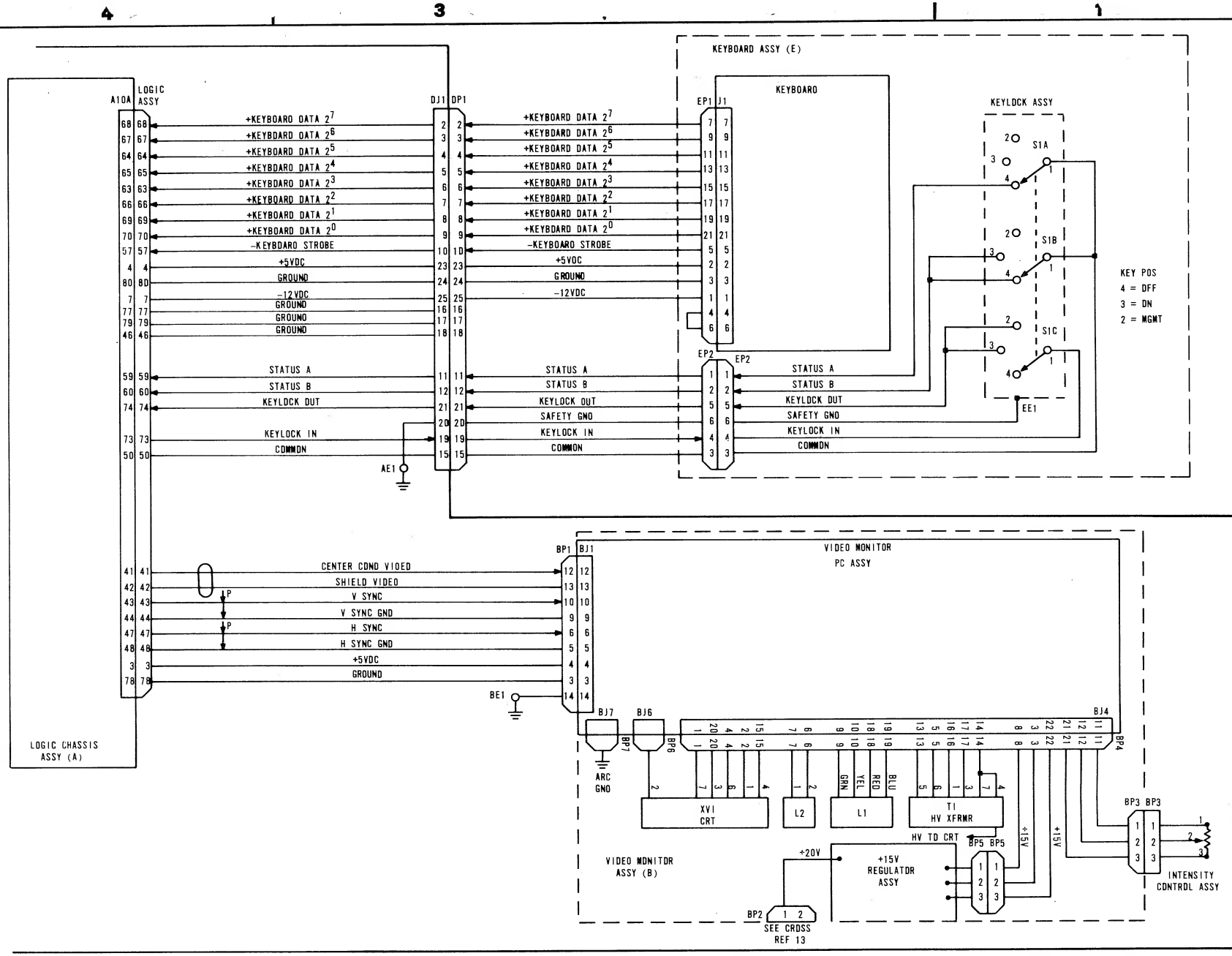

STIC
LOCATION 07
02 P1-36 P1-63 +PANEL 2^7
02 P1-30 P1-64 +PANEL 2^6
02 P1-33 P1-68 +PANEL 2^5
02 P1-37 P1-65 +PANEL 2^4
02 P1-48 P1-66 +PANEL 2^3
02 P1-50 P1-70 +PANEL 2^2
02 P1-55 P1-69 +PANEL 2^1
02 P1-58 P1-67 +PANEL 2^0
P1-60 -INTERRUPT 7
P1-62 -INTERRUPT 6
P1-55 -INTERRUPT 5
P1-57 -INTERRUPT 4
P1-51 -INTERRUPT 3
10 P2-34 P1-53 -INTERRUPT 2
08 P1-25 P1-49 -INTERRUPT 1
P1-17 -EXT INT #2
P1-20 -EXT INT #3
P1-18 -EXT INT #4
02 P1-57 P1-24 +EXECUTE SWITCH N.O.
02 P1-60 P1-21 +EXECUTE SWITCH N.C.
03 P1-83 P1-30 -PARITY ERROR
P1-73 -DISABLE JUMP
08 P1-30 P1-32 -BUS FREE
06 P1-85 P1-19 -POWR
02 P1-25 P1-36 -MR/AUTOLOAD
08 P1-49 P1-28 -INTERNAL TIME OUT
07 P1-77 P1-7 +ALARM
07 P1-23 P1-25 +TIMER CLOCK
06 P1-58 P2-33 -CHAN 0 STROBE
P2-69 +MODULE SELECT 2^3
P2-70 +MODULE SELECT 2^2
P2-73 +MODULE SELECT 2^1
P2-74 +MODULE SELECT 2^0
* P2-56 +ADDRESS BUS 2^4
* P2-58 +ADDRESS BUS 2^2
* P2-59 +ADDRESS BUS 2^1
* P2-60 +ADDRESS BUS 2^0
* P2-21 -MTI
* P2-38 -READY
* P2-41 -MEMORY REQUEST
* P2-22 +2 MHZ
* P2-44 -MASTER RESET FROM PROC
* P2-43 -WRITE
P2-29 -TEST RESET 1
P2-27 -TEST RESET 2
P2-25 -TEST RESET 3
FOR MODULE LOGIC SEE HARDWARE MAINTENANCE MANUAL 62961100
-INTERRUPT 7 P1-59 06 P1-31
-INTERRUPT 6 P1-61 06 P1-24
-INTERRUPT 5 P1-56 06 P1-23
-INTERRUPT 4 P1-58 06 P1-33
-INTERRUPT 3 P1-52 06 P1-55
-INTERRUPT 2 P1-54 06 P1-47
-INTERRUPT 1 P1-50 06 P1-53
-INTERRUPT 0 P1-34 06 P1-52
+AUX 7 P1-33 02 P1-34
+AUX 6 P1-29
+AUX 5 P1-35
+AUX 4 P1-31
+AUX 3 P1-45 10 P1-37
+AUX 2 P1-46 10 P1-61
+AUX 1 P1-43 10 P1-39
+AUX 0 P1-44
-AUX 0 P1-8 02 P1-8
23 -SELECTABLE FREQ I P1-10
22 -SELECTABLE FREQ II P1-27 08 P1-10
+DATA 2^7 LED P1-39 02 P1-27
+DATA 2^6 LED P1-40 02 P1-32
+DATA 2^5 LED P1-38 02 P1-28
+DATA 2^4 LED P1-37 02 P1-42
+DATA 2^3 LED P1-47 02 P1-43
+DATA 2^2 LED P1-48 02 P1-46
+DATA 2^1 LED P1-42 02 P1-52
+DATA 2^0 LED P1-41 02 P1-53
+1200 HZ (75 BAUD) P1-23 07 P1-25
+2400 HZ (150 BAUD) P1-9 08 P1-9
+4800 HZ (300 BAUD) P1-12 08 P1-12
+9600 HZ (600 BAUD) P1-11 08 P1-11
+19,200 HZ (1200 BAUD) P1-15 08 P1-15
+38,400 HZ (2400 BAUD) P1-16 08 P1-16
+76,800 HZ (4800 BAUD) P1-13 08 P1-13
+153,600 HZ (9600 BAUD) P1-14 08 P1-14
+PARITY ERROR LED P1-22 02 P1-41
-GATE A12→A15 P1-26 06 P1-32
-(POWR+AUTOLOAD) P1-74 10 P1-82
-MR TO PROCESSOR P2-38 *
-ANTICIPATE READY P2-37 *
+ADDRESS BUS 2^15 P2-45 *
+ADDRESS BUS 2^14 P2-46 *
+ADDRESS BUS 2^13 P2-47 *
+ADDRESS BUS 2^12 P2-48 *
+DATA BUS 2^7 P2-61 *
+DATA BUS 2^6 P2-62 *
+DATA BUS 2^5 P2-63 *
+DATA BUS 2^4 P2-64 *
+DATA BUS 2^3 P2-65 *
+DATA BUS 2^2 P2-66 *
+DATA BUS 2^1 P2-67 *
+DATA BUS 2^0 P2-68 *
NON STANDARD ABREVIATIONS
EXT INT - EXTERNAL INTERRUPT
MR - MASTER RESET
POWR - POWER ON MASTER RESET
AUX - AUXILIARY
* DENOTES BUSSED SIGNAL
REV A
DWG NO 62200826
SHEET 8
CROSS REF NO 07
CODE IDENT 15920
C
STIC
CONTROL DATA
LOC 07
CROSS REF NO 07


ASYNC I/F-2
LOCATION D8
FOR MODUAL LOGIC SEE HARDWARE MAINTENANCE MANUAL 62960300
-DATA RS (A)
+DSR RS (A)
+CTS RS (A)
+RING IND RS (A)
+C ON RS (A)
+2ND CON RS (A)
+DATA TTL (A)
-DATA TTL (A)
-DSR TTL (A)
-CTS TTL (A)
-RING IND TTL (A)
-CON TTL (A)
-DATA RS (B)
+DSR RS (B)
+CTS RS (B)
+RING IND RS (B)
+CON RS (B)
+2ND CON RS (B)
+DATA TTL (B)
-DATA TTL (B)
-DSR TTL (B)
-CTS TTL (B)
-RING IND TTL (B)
-CON TTL (B)
9800 BAUD
4800 BAUD
2400 BAUD
1200 BAUD
600 BAUD
300 BAUD
150 BAUD
VAR FREQ 11
-CHAN 1 STROBE
-WRITE
-MASTER RESET
+2MHZ
+ADD BUS 2^2
+ADD BUS 2^1
+ADD BUS 2^0
RCV
RCV
TRANSMIT (ANALOG)
TRANSMIT (ANALOG)
KEYLOCK IN
KEYLOCK OUT
-XMT DATA RS (A)
+DTR RS (A)
+RTS RS (A)
+2ND RTS RS (A)
+XMT DATA TTL (A)
-DTR TTL (A)
-RTS TTL (A)
-XMT DATA (A)
+DTR (A)
+RTS (A)
-RCV DATA (A)
+CON (A)
+CTS (A)
-XMT DATA RS (B)
+DTR RS (B)
+RTS RS (B)
+2ND RTS RS (B)
+XMT DATA TTL (B)
-DTR TTL (B)
-RTS TTL (B)
-XMT DATA (B)
+DTR (B)
+RTS (B)
-RCV DATA (B)
+CON (B)
+CTS (B)
+12V
-12V
-INTERRUPT 1
-ANTICIPATE READY
DATA BUS 2^7
DATA BUS 2^6
DATA BUS 2^5
DATA BUS 2^4
DATA BUS 2^3
DATA BUS 2^2
DATA BUS 2^1
DATA BUS 2^0
RECEIVE (ANALOG)
RECEIVE (ANALOG)
TRANSMIT (ANALOG)
TRANSMIT (ANALOG)
KEYLOCK IN
KEYLOCK OUT
NOTES:
* DENOTES BUSSED SIGNALS
( ) ACTIVE WHEN MODEM OPTION PRESENT
1 NOT USED IN ASYNC I/F-2 MODULE-TIE POINT ONLY.
REV A
DWG NO 62200826
SHEET 9
CROSS REF NO 08
CODE IDENT 15920
C
ASYNC I/F-2
CONTROL DATA
LOC 08
CROSS REF NO 08

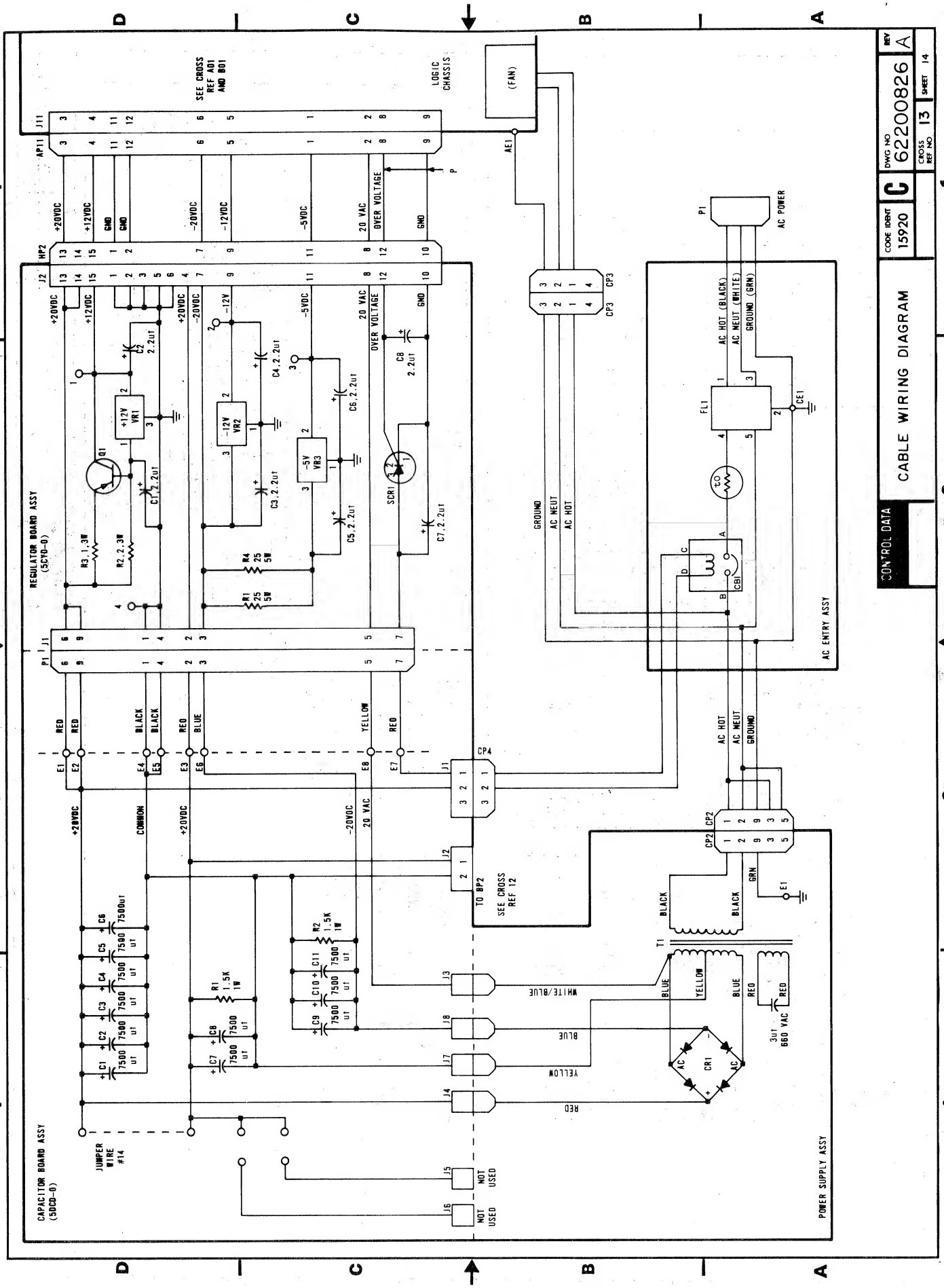

MODEM MODULE (OPTION)
LOCATION D9
08 P1-54 P1-54 RECEIVE (ANALOG)
08 P1-56 P1-55 RECEIVE (ANALOG)
08 P1-38 P1-57 -TRANSMIT DATA (RS)
08 P1-44 P1-58 +OTR (RS)
08 P1-42 P1-68 +RTS (RS)
P1-26 +RING INDICATOR
P1-35 TRANSMIT DATA (TTL)
P1-37 RTS (TTL)
P1-40 OTR (TTL)
B01-P1-32 P1-34 +12V (REG)
B01-P1-26 P1-29 -12V (REG)
P1-9 LOCAL LOOP BACK
P1-10 REMOTE LOOP BACK
P1-11 SWITCH COMMON
P1-12 MARK TEST
P1-13 SPACE TEST
P1-27 COUPLER CUT THROUGH
P1-28 SWITCH HOOK
09 P1-14 P1-15 OSCILLATOR IN
TRANSMIT (ANALOG) P1-51 08 P1-50
TRANSMIT (ANALOG) P1-52 08 P1-52
-RECEIVE DATA (RS) P1-56 08 P1-51
RING INDICATOR (RS) P1-61 08 P1-62
DSR (RS) P1-63 08 P1-55
CTS (RS) P1-64 08 P1-53
CON (RS) P1-65 08 P1-49
RING INDICATOR (TTL) P1-16
RECEIVE DATA (TTL) P1-36
CTS (TTL) P1-38
DSR (TTL) P1-39
CON (TTL) P1-41
DATA REQUEST P1-23
OFF HOOK P1-24
OSCILLATOR OUT P1-14 09 P1-15
REV A
DWG NO 62200826
SHEET 10
CROSS REF NO 09
CODE IDENT 15920 C
MODEM MODULE (OPTION)
CONTROL DATA
LOC 09
CROSS REF NO 09

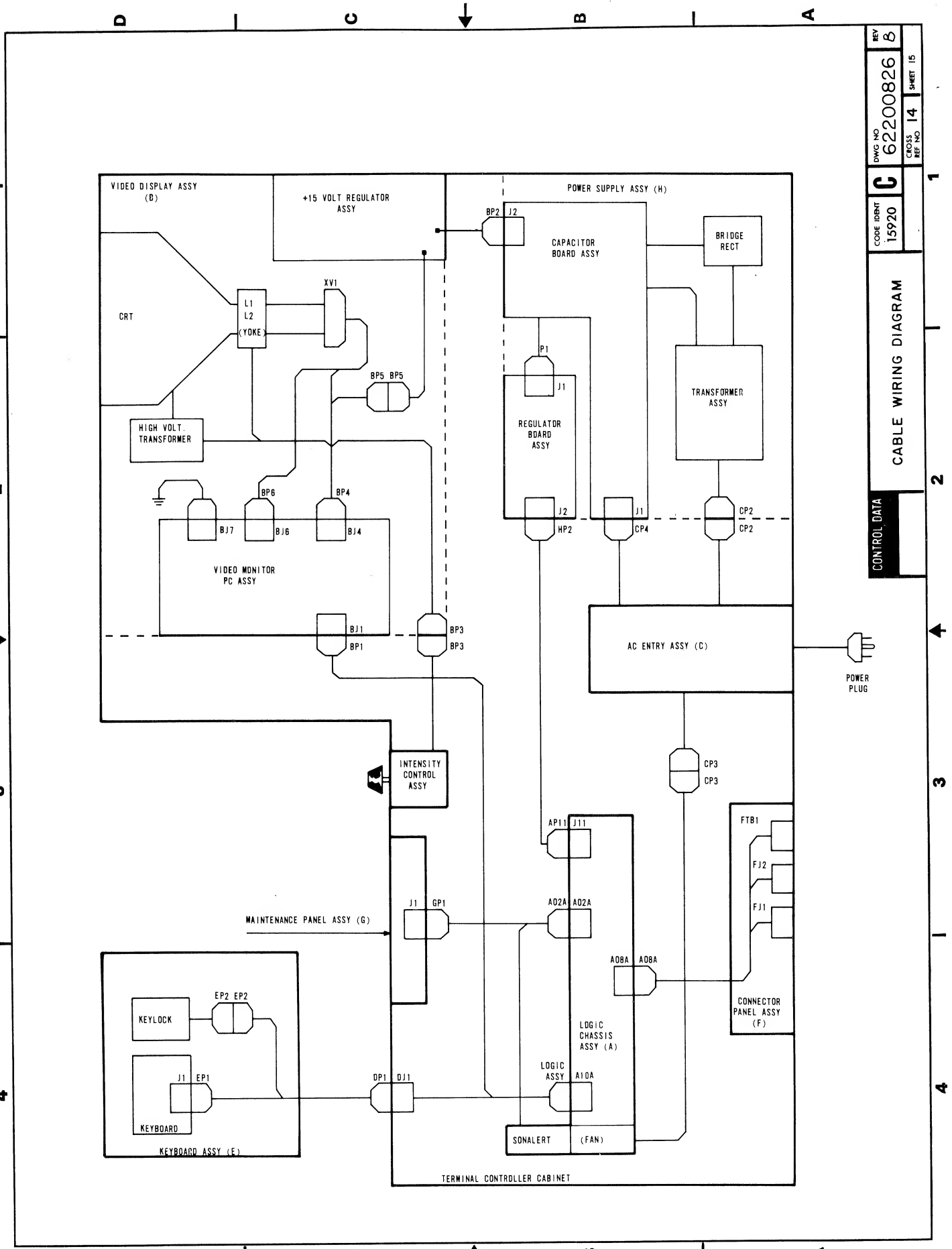

DISPLAY/KYBD I/F MODULE
LOCATION 10
FOR MODULE LOGIC SEE HARDWARE MAINTENANCE MANUAL 62969300
-KYBD STRDBE
+KYBD DATA 2^7
+KYBD DATA 2^6
+KYBD DATA 2^5
+KYBD DATA 2^4
+KYBD DATA 2^3
+KYBD DATA 2^2
+KYBD DATA 2^1
+KYBD DATA 2^0
+EXT STATUS A
+EXT STATUS B
CLOCK IN
-TEST RESET
-40/+80 CHAR
40/80 SWITCH GND
+50/-60 HZ
-ODD/+ALL LINES
ODD/ALL SWITCH GND
+SELECT ADD 2^15
+SELECT ADD 2^14
+SELECT ADD 2^13
+SELECT ADD 2^12
+SELECT ADD 2^11
+SELECT ADD 2^10
+SELECT ADD 2^9
+SELECT ADD 2^8
-FULL DIM
+12V
+12V
-12V
-12V
-(PDMR+AUTOLDAD)
20 VAC
-CHAN 2 STROBE
-BUS ENABLE 2
-WRITE
-MASTER RESET
-MT3
KEYLOCK IN
KEYLOCK OUT
+VIDEO
VIDEO GND
+HORIZ SYNC
HORIZ SYNC GND
+VERT SYNC
VERT SYNC GND
CLOCK OUT
GND
-INTERRUPT 2
-BUS REQUEST 2
-MEM REQUEST
-READY
+ADDRESS BUS 2^15
+ADDRESS BUS 2^14
+ADDRESS BUS 2^13
+ADDRESS BUS 2^12
+ADDRESS BUS 2^11
+ADDRESS BUS 2^10
+ADDRESS BUS 2^9
+ADDRESS BUS 2^8
+ADDRESS BUS 2^7
+ADDRESS BUS 2^6
+ADDRESS BUS 2^5
+ADDRESS BUS 2^4
+ADDRESS BUS 2^3
+ADDRESS BUS 2^2
+ADDRESS BUS 2^1
+ADDRESS BUS 2^0
+DATA BUS 2^7
+DATA BUS 2^6
+DATA BUS 2^5
+DATA BUS 2^4
+DATA BUS 2^3
+DATA BUS 2^2
+DATA BUS 2^1
+DATA BUS 2^0
NOTES:
1 NOT USED IN ASYNC I/F-2 MODULE-TIE POINT ONLY.
* DENOTES BUSSED SIGNAL.
REV A
DWG NO 62200826
SHEET 11
CROSS REF NO 10
CODE IDENT 15920
C
DISPLAY/KYBD I/F MODULE
CONTROL DATA
LOC 10
CROSS REF NO 10


CONTROL DATA
CABLE WIRING DIAGRAM
CODE IDENT 15920
C
DWG NO 62200826
REV A
CROSS REF NO 11
SHEET 12
CONNECTOR PANEL ASSY (F)
LOGIC CHASSIS ASSY (A)
MAINTENANCE PANEL ASSY (G)
SONALERT
FE1
FTB1
FJ2
FJ1
A08A
A02A
J1 GP1
C1
C2
C3
C4
T.P.
RCV
XMT
XMT DATA (A)
RCV DATA (A)
RTS (A)
CTS (A)
DSR (A)
SIGNAL GND
CARRIER ON (A)
2ND CARRIER ON (A)
2ND RTS (A)
DTR (A)
RING INDICATOR (A)
XMT DATA (B)
RCV DATA (B)
RTS (B)
CTS (B)
DSR (B)
SIGNAL GND
CARRIER ON (B)
2ND CARRIER ON (B)
2ND RTS (B)
DTR (B)
RING INDICATOR (B)
KEYLOCK IN
KEYLOCK OUT
+ DATA SWITCH 2^7
+ DATA SWITCH 2^6
+ DATA SWITCH 2^5
+ DATA SWITCH 2^4
+ DATA SWITCH 2^3
+ DATA SWITCH 2^2
+ DATA SWITCH 2^1
+ DATA SWITCH 2^0
EXECUTE (NO)
EXECUTE (NC)
RESET (NC)
RESET (NO)
+ CARRIER DETECT
+ TERMINAL ON
– RECEIVE DATA
+ TERMINAL ACTIVE
+ TERMINAL READY
+ MEM PARITY ERROR
+ DTR
+ XMT REQUEST
+ RTS
+ CTS
+ TRANS IN PROG
+ COMM ERROR
– XMT DATA
+5 VDC
SWITCHES COMMON
COMMON
COMMON
GROUND
GROUND
GROUND
+5V
–AUX RETR 2^0
P



CONTROL DATA	CABLE WIRING DIAGRAM	CODE IDENT 15920	C	DWG NO 62200826	REV 8
				CROSS REF NO 12	SHEET 13


CABLE WIRING DIAGRAM
CONTROL DATA
CODE IDENT 15920
C
DWG NO 62200826
REV A
CROSS REF NO 13
SHEET 14
REGULATOR BOARD ASSY (5CY0-0)
CAPACITOR BOARD ASSY (5DC0-0)
POWER SUPPLY ASSY
AC ENTRY ASSY
AC POWER
LOGIC CHASSIS
(FAN)
SEE CROSS REF A01 AND B01
SEE CROSS REF 12
TO BP2
JUMPER WIRE #14
NOT USED
+20VDC
+12VDC
GND
-20VDC
-12VDC
-5VDC
20 VAC
OVER VOLTAGE
COMMON
AC HOT
AC NEUT
GROUND
AC HOT (BLACK)
AC NEUT (WHITE)
GROUND (GRN)
WHITE/BLUE
BLUE
YELLOW
RED
BLACK
GRN
3ut 660 VAC



CONTROL DATA

CABLE WIRING DIAGRAM

CODE IDENT 15920 | DWG NO 62200826 | REV C | SHEET 15 | CROSS REF NO 14

This section provides preventive maintenance, maintenance aids, troubleshooting information, and removal/replacement procedures for field maintenance of the display terminal. Troubleshooting information is in the form of diagnostic decision logic tables that reference recommended corrective actions to be performed. The maintenance philosophy for on-site repair of the terminal is limited to locating defective modules, subassemblies, or cables and replacing them. Component level maintenance is normally to be performed only at a repair center. However, replacement information is provided for those components listed on the equipment spare parts lists, in case limited access to a repair center make field replacement of these items desirable.

PREVENTIVE MAINTENANCE

Preventive Maintenance should be performed on a regular schedule to help prevent terminal equipment failures. The suggested plan for the performance of preventive maintenance specifically pertains to the Ticketron application of the display terminal in various type environments. If the terminal application is other than that of Ticketron, this plan should serve as a guideline for scheduling preventive maintenance for that application. The primary factor that has to be taken into consideration when setting up such a schedule is the equipment's usage.

- Arena: One PM call per month per terminal, during the exhibition of an event.
- Box Office: Four PM calls per year per terminal, performed at equal intervals.
- Remote (Department Stores, etc.): Four PM calls per year per terminal, commencing 3 months following the terminal's installation and scheduled at approximately equal intervals thereafter.

The preventive maintenance operations to be performed at these intervals are as follows:

Interval	Operation
Every month (arena) or every 3 months (box office or remote)	General inspection and cleaning of equipments in the terminal configuration.
Once a year	In addition to the general inspection and cleaning operations, additional cleaning and operational checks/adjustments should be made.

GENERAL PREVENTIVE MAINTENANCE PROCEDURE

Cleaning operations for the display terminal follow. Refer to the applicable equipments hardware maintenance manual for preventive maintenance procedures to be performed on any device that may be associated with the display terminal (such as, ticket printer, ticket printer controller, matrix printer, etc.). A general inspection of the equipments, including proper seating of external cable connectors, should also be made.

Remove power from the display terminal and clean as follows:

1) Dust keyboard with a soft-bristled brush.
2) Clean the crt screen, using name-brand glass cleaner and soft, lint-free cloth.
3) Wipe exterior of display terminal, using a damp lint-free cloth.

ANNUAL PREVENTIVE MAINTENANCE PROCEDURE

The following procedure lists the operational checks and adjustments that are to be performed on the display terminal at this interval. The general cleaning procedure described under the General Preventive Maintenance Procedure should also be performed at this time. Refer to the applicable equipments hardware maintenance manual for operational checks, lubrication, and adjustments to be performed on any device that may be associated with the display terminal (such as, ticket printer, ticket printer controller, matrix printer, etc.).

With power applied, perform the following operations:

1) Check and adjust, if required, the +5-V output of the regulator card at chassis location B01. Check for +5 volts ±1% at TP1 of the regulator card and adjust the potentiometer on the board edge for correct voltage. Refer to figure CRT24 for test points and potentiometer locations.
2) Check for proper character display. Refer to table CRT1, sheet 2. Perform related adjustments if required.

MAINTENANCE AIDS

Normal field maintenance does not require special tools or test equipment. Simple screwdrivers, wrenches, etc., for module removal, and a hand-held multimeter for voltage checks are adequate. A name-brand glass cleaner, lint-free cloth, and a soft bristled brush are recommended for general cleaning of the display terminal.

MAINTENANCE PANEL SWITCHES AND INDICATORS

The maintenance panel, see figure 6-1, provides several switches and indicators to control diagnostic execution and monitor terminal operations. These are described in the following paragraphs. Since the general operation of the maintenance panel switches and indicators are under program control, it is necessary that the person performing maintenance on the display terminal be familiar with the diagnostic-autoload sections of the firmware program employed in the application, so the maintenance panel as a maintenance aid can be used to its fullest. In the case of the Ticketron application of the display terminal, a detailed description of these aspects of that firmware program is contained in appendix C. For an application other than Ticketron, the customer will have to be consulted to gain an understanding about these aspects for that firmware program. If the differences are not too great, the information in appendix C may provide a basis of reference with the differences between the programs being taken into consideration accordingly.

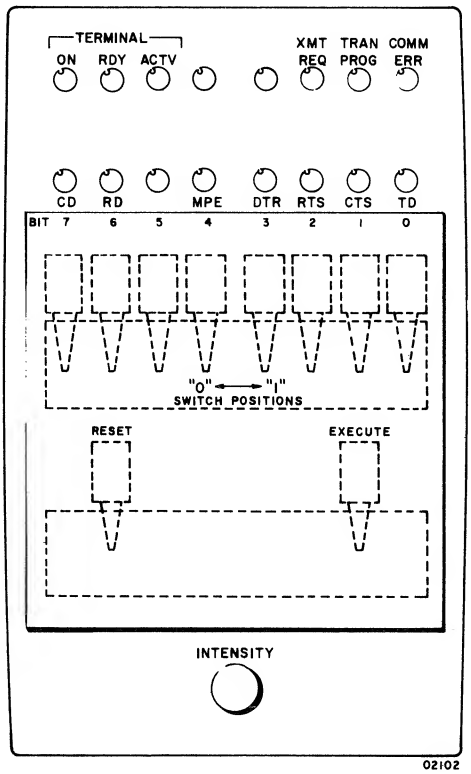


Figure 6-1. Maintenance Panel

Upper Eight Indicators

The type of information reflected by the upper row of maintenance panel indicators depends on whether the display terminal is in a normal operating state or a diagnostic state. The diagnostic state occurs during display terminal initialization

after a power-on master clear or manual reset has been performed, or during the execution of selected diagnostic-autoload sections of the firmware program initiated by manual intervention through the use of the RESET and 0 through 7 switches on the maintenance panel. In the case of the Ticketron application of the display terminal, the 8-bit binary codes that appear in these circumstances for that application are described in appendix C. When the display terminal is not in a diagnostic state, it is in the normal operating state and the information reflected by these indicators, under program control, is as follows:

- ON —
- RDY — } Program execution has been performed
- ACTV — Active
- XMT REQ — Transmit request
- COMM ERR — Communication error

Lower Eight Indicators

The lower row of indicators on the maintenance panel reflects the following communications interface status conditions:

- CD — Carrier detect
- RD — Receive data
- MPE — Memory (RAM) parity error (hardware generated)
- DTR — Data terminal ready
- RTS — Request to send
- CTS — Clear to send
- TD — Transmit data

Switches 0 through 7

These eight maintenance panel switches are used to control the diagnostic-autoload execution. Refer to procedure CRT1, Executing Quicklook Diagnostic, for applicable switch settings of the Ticketron application.

RESET Switch

This switch is used to reinstate the diagnostic-autoload sequence or exit from a selected section as determined by the settings of maintenance panel switches 0

through 7. This switch performs the same actions as those initiated by a power-on master clear. Refer to appendix C for specific use of the RESET switch in the Ticketron application.

EXECUTE Switch

This switch is used in conjunction with the autoload section of the firmware program to initiate a relead of an unsuccessfully loaded program page of the application program. Refer to the Autoload description contained in appendix C for specific use of the EXECUTE switch in the Ticketron application.

PRINTED-CIRCUIT BOARD VOLTAGE INDICATORS

Indicators are provided on several PC boards of the logic chassis to indicate the presence of voltages on the board. The indicators do not mean that the correct voltage is present, only that a positive or negative voltage level, sufficient to light the indicator, is there. All indicators must be in the on (illuminated) condition for correct operation. Indicator color, associated dc voltage, and card locations are described in table 6-1.

TABLE 6-1. PRINTED-CIRCUIT CARD VOLTAGE INDICATORS

INDICATOR COLOR	PRINTED-CIRCUIT CARD LOCATION					
	A01* and B01	03*	06	08	09**	10
Yellow	+20-V dc	—	+12-V dc	+12-V dc	+12-V dc	+12-V dc
Green	-20-V dc	-9-V dc	-5-V dc	-12-V dc	-12-V dc	-12-V dc
Red	+5-V dc	—	—	—	—	—

* Not applicable to the CC617-B model
** Only applicable to CC617-B model units that contain optional modem module

TROUBLESHOOTING AND CORRECTIVE MAINTENANCE

Troubleshooting information is in the form of diagnostic decision logic tables (DDLT). A diagnostic decision logic table is a specialized format for portraying troubleshooting information with reference to specific procedures to be performed for corrective action.

The value of the DDLT is that it presents a tabular display of conditions that can easily be examined to indicate which action or actions to be performed for each set of circumstances. Basically, the table is arranged in four sections or quadrants. These quadrants are called conditions, situations, actions, and sequence of actions. An example of such a table is shown in figure 6-2.

TABLE 6-X. POWER SUPPLY CHECKS

ASSUME Power cord is inserted in ac outlet.						
CONDITIONS	SITUATIONS					
	1	2	3	4	5	6
Does Power indicator/switch illuminate when pressed?	Y	N	N	N	N	OTHER
Has red circuit breaker CB2 tripped?	-	N	Y	Y	Y	
Will CB2 stay in when pressed?	-	-	Y	N	N	
Turn power off; disconnect plug in J1. Turn power on, will CB2 now stay set?	-	-	-	Y	N	
ACTIONS	SEQUENCE					
Go to table 6-___.	X	-	X	-	-	-
Replace power distribution assembly.	-	1	-	-	3	-
Check for faulty cables.	-	2	-	-	1	-
Replace power supply switch assembly.	-	3	-	-	2	-
Replace power supply (procedure ____).	-	4	-	X	-	-
Call Regional Tech Support.	-	-	-	-	-	X

02385

Figure 6-2. Diagnostic Decision Logic Table Example

CONDITIONS

The upper-left quadrant of a DDLT contains the conditions, or tests, to be performed. Conditions are in the form of questions that can be answered with a yes (Y) or a no (N). A condition that is irrelevant* to the current situation is answered with a (-). It also includes any basic assumptions, such as "Power cord is connected to ac outlet."

SITUATIONS

The various conditions are summerized in columns in the upper-right quadrant, numbered from 1 to 6 in the example. Each column summarizes a unique set of conditions. In using the tables, the conditions listed for column 1 must be examined before moving right to column 2, etc.

The example shows that two conditions (shaded area) are used to define situation number 2. That is, the power indicator/switch does not illuminate when pressed and red circuit breaker CB2 has not tripped. Assuming that these are the conditions observed, then this column would be followed (down) to indicate the sequence of actions to be performed.

* Irrelevant in this application means that the condition should be ignored when examining the various conditions in a given column.

ACTIONS

The lower-left quadrant of the table lists corrective actions for the various combinations of conditions covered in the table.

SEQUENCE OF ACTIONS

The lower-right quadrant lists the sequence of the actions to be performed for each situation with the second, third, fourth, and succeeding actions being performed only if a previous action failed to remedy a problem situation. The sequential numbering of actions reflects the probability of the corresponding action correcting the problem, with the most likely listed first. When only one action is listed, an X is used instead of a number.

Both actions and conditions may refer to specific procedures to follow, for example, when checking and adjusting power-supply voltages. The customer engineer may be directed to exit the table to perform the procedure and then return to the same point in the table to answer any questions that are related to the procedure. He would then continue from this point in the table if the fault still persists.

ARRANGEMENT OF DIAGNOSTIC AND CORRECTIVE MAINTENANCE INFORMATION

The arrangement of the diagnostic and corrective maintenance information is shown in figure 6-3.

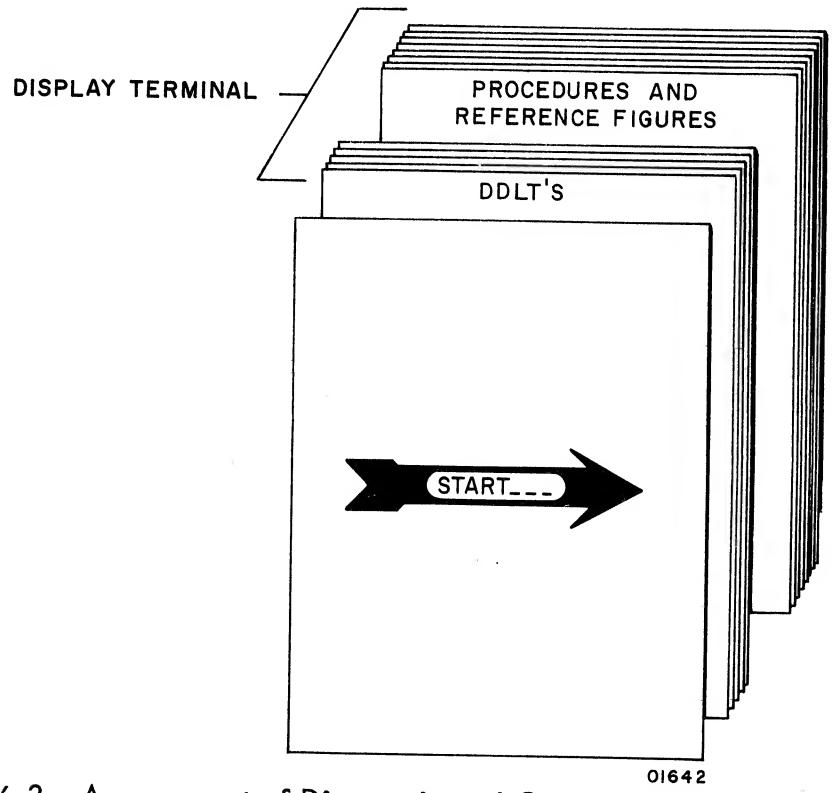
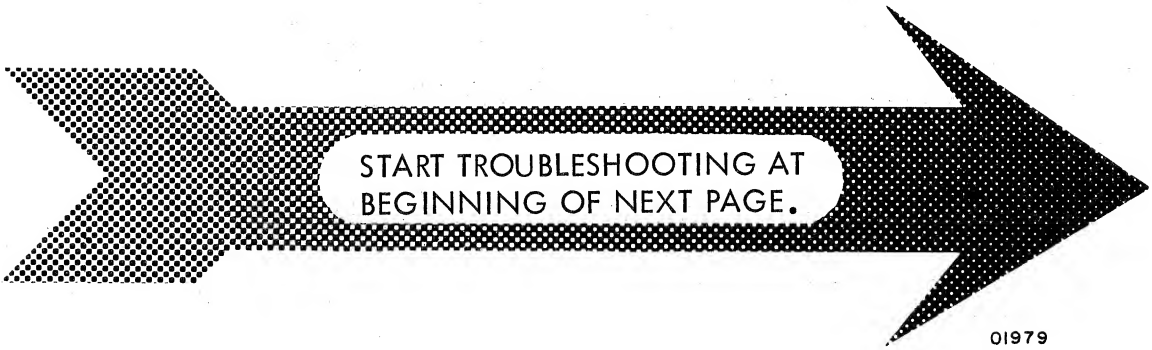


Figure 6-3. Arrangement of Diagnostic and Corrective Maintenance Information

NOTE

If you are unfamiliar with diagnostic decision logic tables, read the explanation of their use described earlier in this section. Then, start at the beginning of the next page and work your way through to the end of this section until you correct any fault.



NOTE

Because the diagnostic decision logic tables (DDLT's) require much time, money, and effort — you, the user, determine whether they will continue in future manuals as a diagnostic aid.

Please use the comment sheet at the back of this manual to let us know the following: 1) Did you actually use these tables? 2) Do you think they are valuable and why or why not? 3) Do you feel this is the best approach to a "cookbook" troubleshooting manual that you have seen, considering that the DDLT's tie everything together; that is, diagnostics, procedures, figures, and tables? 4) To you, what is their most serious shortcoming? 5) How would you improve the DDLT's? Remember, the comment sheet is your direct link with the writer.

CRT DISPLAY/KEYBOARD

TABLE CRT1. DDLT FOR DISPLAY TERMINAL (SHEET 1 OF 6)

INITIAL DISPLAY KEYBOARD CHECKS

ASSUME

Terminal power on. See note 1. Internal switches of display terminal set correctly for terminal configuration. (Refer to section 3.) Quicklook-autoload executed per procedure CRT1. See note 2.

CONDITIONS	SITUATIONS 1	2	3	4	5	6	7	8
Did quicklook run to completion? See note 2.	Y	Y	Y	Y	Y	N	N	OTHER
Did terminal successfully autoload?	Y	Y	Y	N	N	-	-	
Is data stable (no "swimming" or out of sync condition)?	Y	Y	N	-	-	-	-	
Turn intensity up. Is raster visible and fan running?	-	-	-	Y	Y	-	N	
Does display respond to correctly formatted keyboard input?	Y	N	-	Y	N	-	-	
ACTIONS	**SEQUENCE**							
Go to sheet 2 of this DDLT.	X	-	-	-	-	-	-	-
Press RESET switch on maintenance panel (reload software).	-	1	-	1	1	-	-	-
Check keyboard cable to connector panel.	-	2	-	-	-	-	-	-
Check cables from connector panel to backplane and from backplane to video monitor.	-	3	-	-	-	-	4	-
Check modem and Comm connections.	-	-	-	2	-	-	-	-
Replace STIC PC board, procedure CRT18.	-	5	-	-	-	-	-	-
Perform keyboard troubleshooting, sheet 6 of this DDLT.	-	6	-	-	-	-	-	-
Replace display/keyboard I/F board, procedure CRT18.	-	4	1	-	3	-	5	-
Isolate quicklook error per sheet 5 of this DDLT. See note 2.	-	-	-	-	-	X	-	-
Reset circuit breaker at rear of display terminal.	-	-	-	-	-	-	1	-
Check ac power cord	-	-	-	-	-	-	2	-
Check continuity and connections of coax cable from video monitor to backplane.	-	-	-	-	2	-	3	-
Perform internal crt checks per sheet 3 of this DDLT.	-	-	-	-	-	-	6	-
Perform video board voltage checks per sheet 4 of this DDLT.	-	-	2	-	-	-	-	-
Contact Regional Tech Support.	-	-	3	3	4	-	7	X

NOTES:

1) An immediate power-off, power-on application may cause the circuit breaker to trip. Wait a few seconds before reapplying power whenever terminal power is turned off.

   If input power circuit breaker trips, perform procedure CRT11.

2) These items refer specifically to phases of the diagnostic-autoload (firmware) program used in the Ticketron application of the display terminal. If the terminal being troubleshooted is not employed in the Ticketron application, any differences that may exist between that program and the Ticketron program (described in appendix C) will have to be taken into consideration accordingly.

TABLE CRT1. DDLT FOR DISPLAY TERMINAL (SHEET 2 OF 6)

VIDEO DATA CHECKS

ASSUME

Video data present and stable (no swim). Display/keyboard I/F board switches set correctly. Refer to procedure CRT2 for display cabinet hood removal if required.

CONDITIONS	SITUATIONS 1	2	3	4	5	6	7	8
Do correct characters display following keyboard input?	Y	Y	Y	Y	N	N	N	OTHER
Do all control functions generate the correct response?	Y	Y	Y	N	-	-	-	
Is data tilted or not centered on screen?	N	N	Y	-	-	-	-	
Is there any character distortion?	N	Y	-	-	-	-	-	
Is dot pattern incorrect (missing parts of character)?	N	N	N	N	N	Y	-	
Is screen size reduced from normal?	N	N	N	N	N	N	Y	
ACTIONS	**SEQUENCE**							
Display/keyboard checks OK.	X	-	-	-	-	-	-	-
Perform tilt or centering adjustments, procedure CRT8.	-	1	X	-	-	2	-	-
Perform power supply voltage checks, procedure CRT15.	-	3	-	-	-	-	2	-
Replace crt monitor board, procedure CRT5.	-	4	-	-	-	-	3	-
Press RESET switch on maintenance panel (reload software).	-	-	-	1	1	-	-	-
Go to sheet 6 of this DDLT, Keyboard Troubleshooting.	-	-	-	2	3	-	-	-
Replace display/keyboard I/F board, procedure CRT18.	-	5	-	-	4	1	-	-
Replace vertical choke (height reduced), procedure CRT10.	-	-	-	-	-	-	5	-
Perform size adjustments, procedure CRT8.	-	2	-	-	-	-	1	-
Replace yoke, procedure CRT9.	-	-	-	-	-	-	4	-
Replace Async I/F-2 board, procedure CRT18.	-	-	-	-	2	-	-	-
Replace flyback transformer (width reduced), procedure CRT3.	-	-	-	-	-	-	6	-
Contact Regional Tech Support.	-	6	-	3	5	3	7	X

TABLE CRT1. DDLT FOR DISPLAY TERMINAL (SHEET 3 OF 6)

INTERNAL CRT DISPLAY CHECKS					
ASSUME No data and no raster. Checks of sheet 1 of this DDLT completed. Refer to procedure CRT2 for display cabinet hood removal.					
CONDITIONS	SITUATIONS				
	1	2	3	4	
Are LED indicators on the +5-V regulator PC board(s) lit? See note below.	Y	Y	N	O	
Is crt filament lit?	Y	N	N	T	
				H	
				E	
				R	
ACTIONS	SEQUENCE				
Check internal cable connections.	1	1	1	-	
Perform power checks, procedure CRT15.	2	2	2	-	
Check voltages at crt monitor board, procedure CRT13.	3	3	-	-	
Replace crt monitor PC board, procedure CRT5.	4	4	-	-	
Check Intensity control, procedure CRT14.	5	-	-	-	
Replace high-voltage transformer assembly, procedure CRT3.	6	-	-	-	
Replace yoke, procedure CRT9.	7	-	-	-	
Replace crt, procedure CRT7.	8	5	-	-	
Contact Regional Tech Support.	9	6	3	X	
NOTE: The CC617-A model contains two +5-V regulator boards at chassis location A01 and B01, while the CC617-B model contains just one +5-V regulator board at location B01.					

TABLE CRT1. DDLT FOR DISPLAY TERMINAL (SHEET 4 OF 6)

VIDEO BOARD VOLTAGE CHECKS				
ASSUME CRT monitor board voltage checks made per procedure CRT13.				
CONDITIONS	SITUATIONS			
	1	2	3	4
Were all voltage checks of steps 1 through 17 OK?	N	N	Y	OTHER
Were the +15-V and +5-V checks of steps 18 through 26 OK?	N	Y	Y	
ACTIONS	SEQUENCE			
Replace the crt monitor PC board, procedure CRT5.	1	1	-	-
Replace the yoke, procedure CRT9.	-	2	-	-
Replace the high-voltage transformer assembly, procedure CRT3.	-	3	-	-
Replace the defective +15-V regulator, procedure CRT4.	2	-	-	-
Replace the power supply, procedure CRT21.	3	-	-	-
CRT monitor board voltage checks OK, procedure CRT13.	-	-	X	-
Contact Regional Tech Support.	4	4	-	X

TABLE CRT1. DDLT FOR DISPLAY TERMINAL (SHEET 5 OF 6)

QUICKLOOK ERROR STOPS

ASSUME

Quicklook diagnostic executed (tests 001 through 005) and failed to complete, see note 2.
Refer to procedure CRT1 for quicklook diagnostic execution, see note 1.

CONDITIONS	SITUATIONS 1	2	3	4	5	6
Error code T001X displayed? See note 2. (ROM checksum error.)	Y	N	N	N	N	O
Error code T002X displayed? See note 2. (RAM failure.)	-	Y	N	N	N	T
Error code T003X displayed? See note 2. (Command failure.)	-	-	Y	N	N	H
Error code T004X displayed? See note 2. (Async failure.)	-	-	-	Y	N	E
Test 005 error? See note 2. (CRT did not display all A's, B's, C's, and D's.)	-	-	-	-	Y	R

ACTIONS	SEQUENCE					
For CC617-A: replace ROM board, chassis location 3 (procedure CRT18). For CC617-B: replace program memory board, chassis location 3 (procedure CRT18).	1	-	-	-	-	-
Replace processor board, chassis location 6 (procedure CRT18).	2	-	1	-	-	-
For CC617-A: replace RAM board, chassis location 5 (procedure CRT18). For CC617-B: replace program memory board, chassis location 3 (procedure CRT18).	-	1	2	-	-	-
For CC617-A: replace RAM board, chassis location 4 (procedure CRT18).	-	2	3	-	-	-
Replace Async I/F-2 board, chassis location 8 (procedure CRT18).	-	-	-	1	-	-
Replace STIC board, chassis location 7 (procedure CRT18).	3	-	-	2	-	-
Replace display/keyboard I/F board, chassis location 10 (procedure CRT18).	-	-	-	-	2	-
Verify correct settings of display/keyboard I/F board switches. Refer to section 3 of this manual.	-	-	-	-	1	-
Contact Regional Tech Support.	-	-	-	-	-	X

NOTES:

1) If quicklook fails to initiate or stops with an invalid error display, do the following:
   a) Turn power off and if the terminal is a CC617-A model, swap the two RAM boards at locations 4 and 5; or if the terminal is a CC617-B model, reseat the program memory board at location 3. Rerun quicklook tests.
   b) Perform steps indicated under Unable to Execute Quicklook Diagnostics, procedure CRT1.
2) These items refer specifically to aspects of the diagnostic-autoload (firmware) program used in the Ticketron application of the display terminal. If the terminal being troubleshooted is not employed in the Ticketron application, any differences that may exist between that program and the Ticketron (described in appendix C) will have to be taken into consideration accordingly.

TABLE CRT1. DDLT FOR DISPLAY TERMINAL (SHEET 6 OF 6)

KEYBOARD TROUBLESHOOTING

ASSUME

All cable connections from keyboard to display terminal and backplane OK. Program loaded without error. See note below.

CONDITIONS	SITUATIONS				
	1	2	3	4	5
Keyboard data missing from all keys?	Y	N	N	N	OTHER
Keyboard data missing from one key?	-	Y	N	-	
Incorrect data from some or all keys?	-	-	Y	N	
Keyboard data missing from several keys?	-	-	-	Y	

ACTIONS	SEQUENCE				
Check internal cable connections in keyboard.	1	-	-	-	-
Replace display/keyboard I/F board, procedure CRT18.	3	-	1	-	-
Replace keyboard assembly, procedure CRT19.	2	2	2	1	-
Replace nonoperating switch, procedure CRT20.	-	1	-	-	-
Contact Regional Tech Support.	4	3	3	2	X

NOTE: As referred to in procedure CRT1, if the terminal being troubleshooted is used in the Ticketron application, the keyboard octal codes can be verified with quicklook test 006. The same is true for any other applications that incorporate a similar test in its firmware program. The octal codes that are generated by the keyboard in the Ticketron application, are given in figure C-1 of appendix C. For similar information on keyboards employed in other applications, refer to the manual covering that keyboard, which was initially shipped with the display terminal.

Procedure CRT1 — Executing Quicklook Diagnostic (Ticketron Application Only)

This procedure describes the test operations that can be performed on the terminal using the ROM resident diagnostic program. Switches contained on the maintenance panel, behind a removable snap-on cover, are used to control the diagnostic execution. Refer to appendix C for a detailed description of the diagnostic test sections and autoload program.

Maintenance Panel Switch Settings (Ticketron Application Only)

Establish the test operations to be performed according to the following switch settings. Placing a switch to the left equals logical 0, to the right equals logical 1. For an illustration of the maintenance panel, refer to figure 6-1.

1) Execute quicklook and autoload: Switch 7 through Switch 0 all logical 0.

   Execution will cause the terminal to automatically sequence through quicklook tests 001 through 005, and then jumps to the autoload program. Autoload will load the load page, program 1, and then jump to the start of program 1.

2) Bypass quicklook: Switch 7 a logical 1, Switch 6 through Switch 0 logical 0's.

   Execution will cause the terminal to go directly to the autoload program without performing the quicklook tests. The terminal will load the load page, program 1, and then jump to the start of program 1.

3) Bypass quicklook and autoload: Switch 7 and Switch 6 logical 1's, Switch 5 through Switch 0 logical 0's.

   Execution will cause a jump directly to the start of whatever program is resident in RAM memory.

4) Program pause: Switch 5 a logical 1, Switch 4 through Switch 0 logical 0's, Switch 7 and Switch 6 as desired.

   Note that in the previous three test operations, the final action is a jump to the start of whatever program is resident in RAM memory. A program pause operation causes the terminal to pause before jumping to the start of the RAM program. The terminal remains in the pause condition until maintenance panel Switch 5 is placed in the logical 0 position which causes a jump to the start of the RAM program.

5) Quicklook only: Switch 3 through Switch 0 are used to select specific quicklook tests. If any of these switches is in a logical 1 position, the terminal will perform a selected portion of quicklook but will not continue on to the autoload and will not jump to the start of the resident RAM program.

The binary value of Switch 3 through Switch 0 determines which quicklook tests are to be performed, as follows:

Binary Code	Quicklook Tests Performed
0001	Test 001 through test 005, then halt.
0010	Test 002 through test 005, then halt. (Test 001 is not performed.)
0011	Tests 003 through test 005, then halt. (Tests 001 and 002 are not performed.)
0100	Test 004 and test 005, then halt. (Tests 001,002, and 003 are not performed.)
0101	Test 005 only, then halt.
0110	Test 006 only (keyboard test). Remain in test 006 until RESET is again pressed.
0111	Test 007 only (ticket printer test). Remain in test 007 until RESET is again pressed.
1000	Test 010 only (matrix printer test). Remain in test 010 until RESET is again pressed.

NOTE

To exit from any of the above quicklook only tests, set the maintenance panel switches (Switch 7 through Switch 0) as desired, and press the RESET switch.

Test Execution (Ticketron Application Only)

Initiate diagnostic execution in one of the two following ways:

- If display terminal power is off, apply power by placing the circuit breaker located on the rear panel in the Up position.
- If display terminal power is on, toggle the manual RESET switch located on the maintenance panel and release.

The diagnostic will execute as established by the maintenance panel switch settings.

Normal and Error Indications (Ticketron Application Only)

During diagnostic test execution and program autoload, the crt displays a white block (microdisplay) in the upper-left corner of the screen.

The microdisplay contains a four-digit alphanumerical code that indicates what portion of the diagnostic is being executed. If an error occurs, the diagnostic stops and the code is followed by an X (an exception is quicklook test 003, in which no X will follow this code if an error occurs). The upper row of LEDs on the maintenance panel also indicates which portion of the diagnostic is being executed.

Quicklook Tests: During quicklook tests 001 through 004, the microdisplay code is a T followed by the test number being executed: such as, Tool for quicklook test 001, etc. At this same time, the upper row of maintenance panel indicators (LEDs) are lit to the binary value of the quicklook test being executed; such as, bit 0 indicator lit for test 001, etc. If an error is detected the diagnostic test stops, the maintenance panel LEDs (upper row) remain lit to the binary value of the test number, and the microdisplay code shown on the crt is followed by an X (an exception is quicklook test 003, in which no X will follow this code if an error occurs).

NOTE

For quicklook tests 005, 006, 007, and 010 the display and/or LED indications differ from that of tests 001 through 004. Normal and error indications of all quicklook tests are summarized in table CRT2.

TABLE CRT2. QUICKLOOK TESTS

QUICKLOOK TEST NUMBER	UPPER ROW OF LEDS	MICRODISPLAY	
		NORMAL	ERROR
001 (ROM checksum)	00000001	T001	T001X
002 (RAM test)	00000010	T002	T002X
003 (command test)	00000011	T003	T003
004 (async I/F test)	00000100	T004	T004X
005 (display test)	11111111	Entire crt display fills with all A's, then B's, C's, and D's.	
006 (keyboard test)	00000000	A000 (keylock OFF) A001 (keylock ON) A003 (keylock MGT) When a keyboard key is pressed, this code is replaced by K plus the octal code of that key. Refer to figure 6-2 for keyboard octal codes.	K plus incorrect octal code
007 (ticket printer test)	00000111	T007	T007NR if ticket printer is not ready
010 (matrix printer test)	00001000	T010	T010NR if matrix printer is not ready

Autoload: During program loading and checksumming, indications are provided in the microdisplay area of the crt. A microdisplay of L followed by a reference number indicates the loading of a page of program. For example, L001 indicates loading of the page whose reference designation is 001. If a transmission error occurs when loading a page, the autoload requests a reload of that page. If the page is then loaded correctly, the autoload proceeds with the next task to be performed. If transmission errors reoccur, then after the third unsuccessful reload, an X will be displayed after the page reference number. Once an X has appeared, manual intervention is required as follows:

- Press the EXECUTE switch on the maintenance panel to initiate another reload of the page (as many reloads as desired may be performed in this manner), or
- Press the RESET switch (or turn the terminal power off, then on again) with the maintenance panel Switches 0 through 7 in the logical 0 position. This executes quicklook tests 001 through 005 and autoload.

After loading a page, the autoload immediately checksums the page. If a checksum error occurs, the autoload determines if the page is a load page. If so, a jump is made to the start of the autoload program. If the page is not a load page, the autoload attempts to reload the page. Transmission errors are again checked as described previously. (Three reloads with transmission errors cause an error display.)

If the page is reloaded without transmission errors; it is again checksummed. If the checksum test detects an error, the page is again reloaded. If three reloads occur in succession, each with a checksum error, then the microdisplay will show an error code of C---X. For example, C005X indicates a checksum error of page reference number 005.

Once an X has appeared, manual intervention is required. Perform the same actions as specified for a transmission error; such as, press either the EXECUTE or RESET switch as described in the preceding steps.

A program or hardware fault may cause the loading of a nonexistent program or overlay. This will cause a microdisplay error code of P---X. The octal number of this code indicates the program and overlay number which was requested per the following:

- Convert the number to binary.
- The major 4 bits are the program number and the minor 4 bits are the overlay number requested.

Unable to Execute Quicklook: There are several signals on the logic chassis that are shared on a common bus by more than one logic module. These signals are shown on a Bussed Signal Chart contained in section 5 of this manual. Due to this commonality, it is possible that a hardware malfunction (for example, an address line fault) could occur on one logic module so quicklook would fail to initiate or be unable to provide any visual indication. If this condition occurs, the following procedure can be used to reduce the overall troubleshooting time.

1) Remove display terminal hood per procedure CRT2. Ensure that all connectors on the backplane are secure and all PC board voltage indicators are lit (see table 6-1).

CAUTION

Always turn power off when removing or inserting PC boards. The circuit breaker on the rear panel of the display terminal must be in the Down (off) position.

2) With display terminal power off, withdraw the following PC boards out of their connectors to isolate them from the bus (refer to procedure CRT19). It is not necessary to remove them completely from the logic chassis.
   a) RAM board at chassis location 5, if terminal is a CC617-A model.
   b) Async I/F-2 board at chassis location 8.
   c) Display/keyboard I/F board at chassis location 10.
3) Reapply power. If quicklook provides a 0000 0010 display in the upper row of indicators on the maintenance panel, one of the preceding PC boards is at fault.
4) Reinsert the PC boards one at a time until the original symptoms occur and replace the board causing the failure.
5) If after performing steps 1 through 4, quicklook still fails to initiate, replace the following PC boards one at a time.
   a) Processor board at chassis location 6.
   b) STIC board at chassis location 7.
   c) ROM board at chassis location 3, if terminal is a CC617-A model or program memory board at chassis location 3 if terminal is a CC617-B model.
6) If unable to isolate the problem using this procedure, contact Regional Tech Support.

Procedure CRT2 — Removing Display Cabinet Hood

To remove cabinet hood, perform the following:

WARNING

Use extreme care when handling TV module because rough handling can cause crt to implode with tremendous force resulting in severe injury. Do not nick or scratch glass or subject it to any undue pressure during replacement. When handling crt, always wear safety goggles and heavy gloves for protection.

WARNING

With power applied, severe shock will be received if high-voltage transformer or lead to anode or area of anode on crt is touched. Be careful when following procedures are performed not to touch anything higher than yoke. Keep tools out of area.

1) Remove two screws in rear of cabinet.
2) Lift cabinet hood back and up from chassis.

To install cabinet hood, perform the following:

3) Position cabinet hood in track of chassis.
4) Fasten two screws in rear of cabinet.

Procedure CRT3 — Replacing High-Voltage Transformer Assembly

To remove high-voltage transformer assembly, perform the following:

1) Turn crt power off.
2) Disconnect ac power cord from site power outlet. High voltage normally bleeds off in less than a second when power is removed. However, due to the possibility of an open ground return, it is recommended that the following step be performed.

WARNING

Be careful not to scratch surface of cathode-ray tube. A scratch weakens the glass substantially and can cause the tube to implode.

3) Connect a heavily insulated wire to ground first and then, while carefully lifting rubber anode cover (figure CRT1), discharge surface under rubber cover (including anode terminal end) by sliding end of grounded wire under the rubber cover and into anode hole of cathode-ray tube.

4) Remove high-voltage lead by raising rubber cover and gently compressing spring loaded anode lead.

5) Remove the flag terminals on the five orange transformer wires from connector BP4. (To release each wire, insert the end of a paper clip into the top of the connector to compress flag terminal while gently pulling on wire from bottom of connector.)

6) Remove hex nut, standoff, and lockwashers (2) which hold transformer to chassis and carefully withdraw transformer and high-voltage lead from video module (figure CRT1).

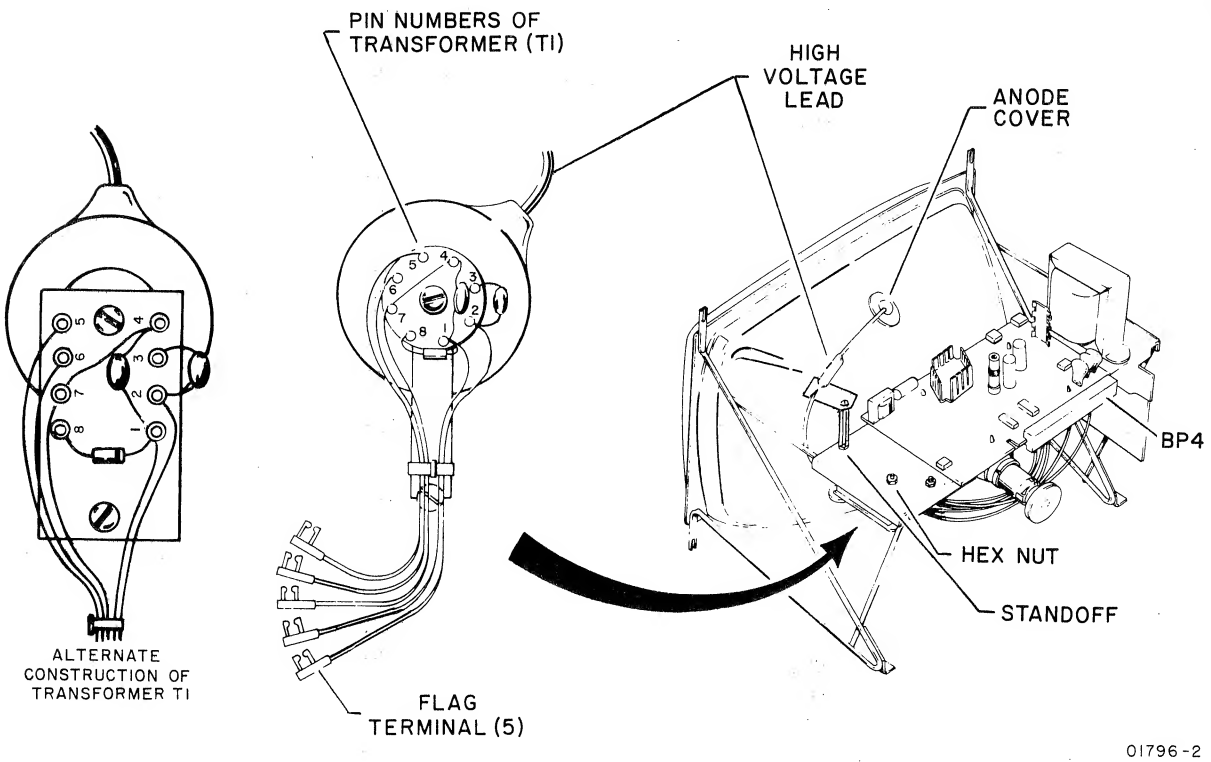


Figure CRT1. High-Voltage Transformer Pin Numbers

To replace transformer assembly, perform the following:

7) Fasten transformer to chassis, using hex nut, standoff and lockwashers removed in step 6, as shown in figure CRT2.

8) Connect high-voltage lead to anode of cathode-ray tube.

9) Connect flag terminals on transformer wires to connector BP4: T1-1 to BP4-16, T1-2 to BP4-17, T1-5 to BP4-13, T1-6 to BP4-5, and T1-7 to BP4-14.

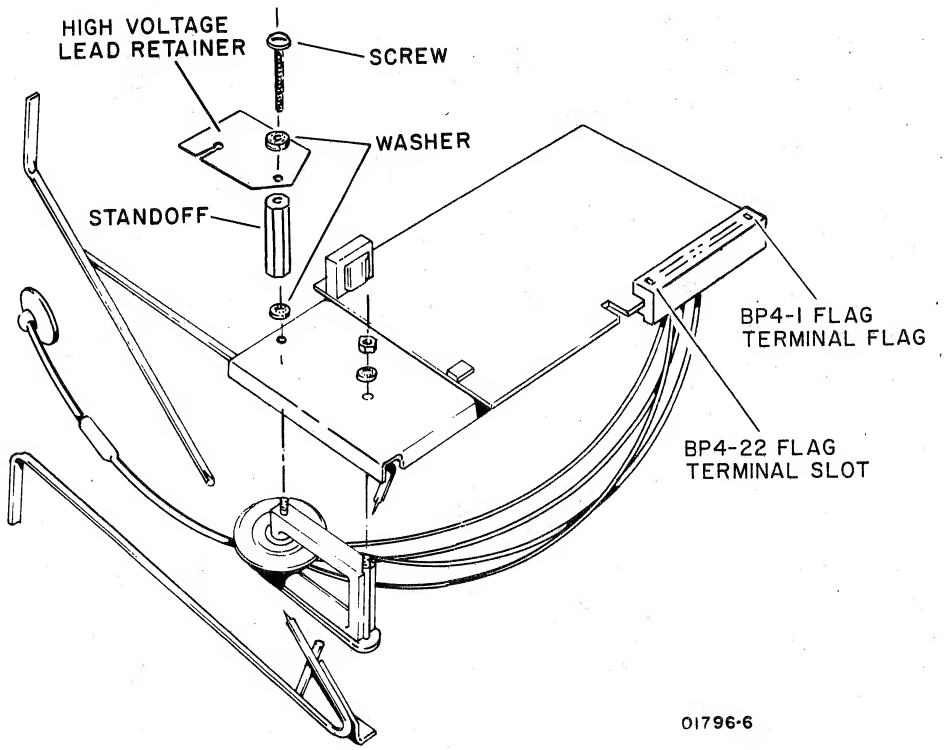


Figure CRT2. High-Voltage Transformer Installation

Procedure CRT4 — Replacing Video Module +15-V dc Regulators

To remove +15-V dc regulators mounted on side of video module (figure CRT3) perform the following:

1) Turn crt power off and disconnect ac power cord from site power outlet.

2) Remove defective regulator by unscrewing screws that hold it to heat sink, grasp regulator firmly, and pull from socket.

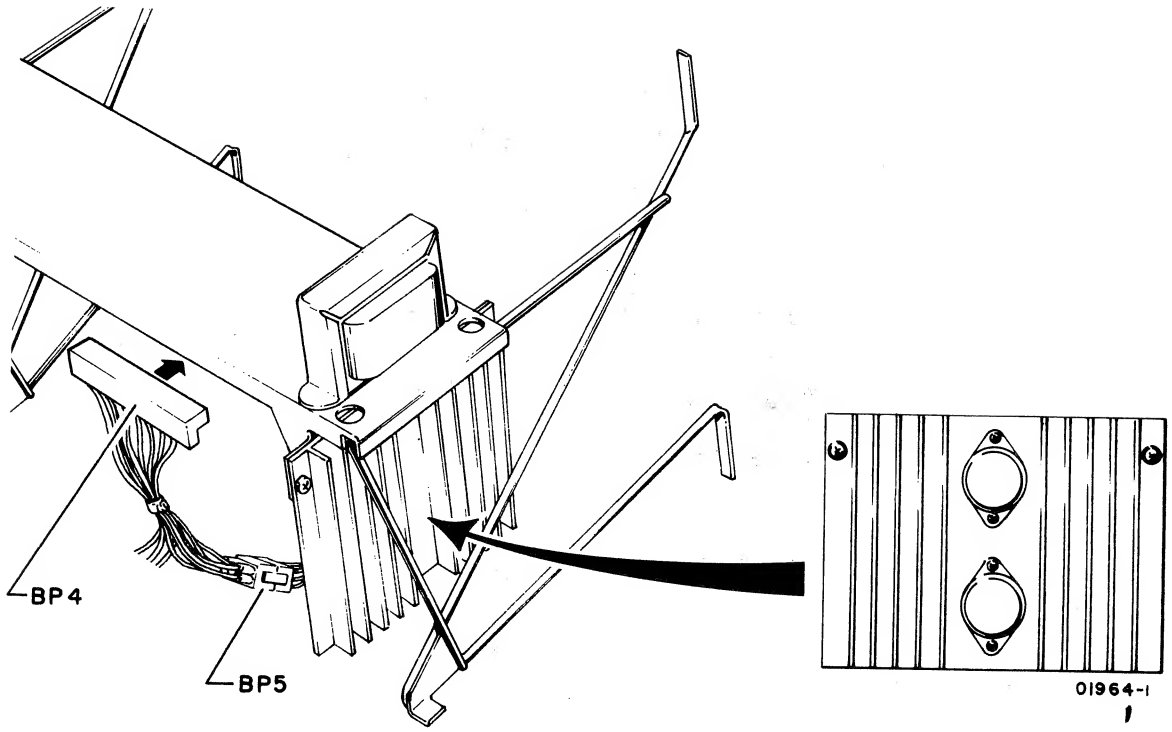


Figure CRT3. 15-Volt Regulator Assembly

To replace +15-V dc regulator, perform the following:

3) Clean surface of heat sink where regulator makes contact and add new insulating thermal compound (CDC part number 94657900) between heat sink washer and regulator.

4) Apply thermal compound to bottom of regulator and plug regulator in socket and fasten with screws.

5) Disconnect BP5 connector (figure CRT3), apply power, and test output of each regulator-to-ground for +15-V dc. Refer to figure CRT4. If output is not +15-V dc, replace regulator. If +15-V dc is found, go to step 6.

6) Replace BP5 connector (with power off) and then test regulators under load for +15-V dc (with power on) per steps 18 through 23 of procedure CRT13.

7) If voltage drops below +14.25-V dc with BP4 connected, replace crt monitor PC board (procedure CRT5).

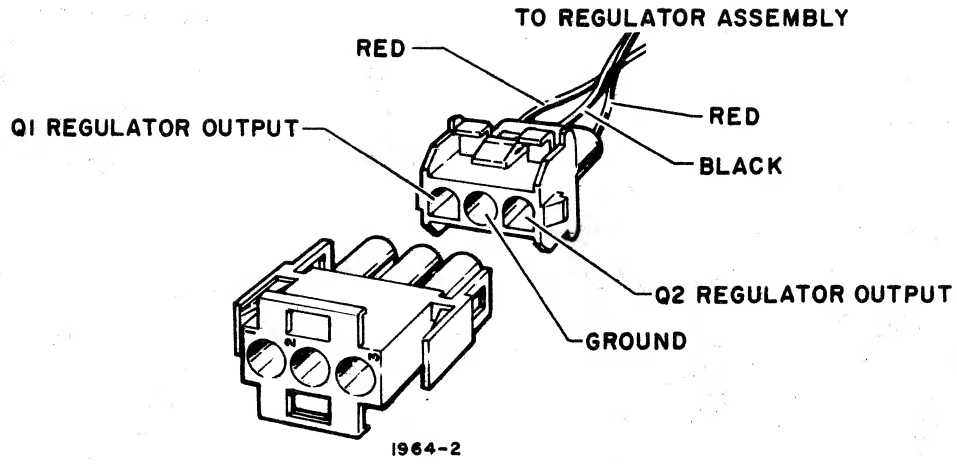


Figure CRT4. BP5 Connector Pins

Procedure CRT5 — Replacing CRT Monitor PC Board

To remove crt monitor PC board, refer to figure CRT5 and perform the following steps:

1) Turn crt power off and disconnect ac power cord from site power outlet.

2) Disconnect connector BP1.

3) Disconnect connector BP6 and BP7 from board.

4) Disconnect connector BP4.

5) Compress retainer clips on mounting pegs and release clips by pressing downward. Do for all four pegs. After releasing PC board from all four pegs, lift board to remove from video module.

6) Install new PC board by positioning board over mounting pegs (match holes on PC board with pegs) and gently pressing board down into position so that friction clips on pegs pass through holes sufficiently to lock board in place.

7) Replace connectors BP1, BP4, BP6, and BP7.

8) If video adjustments are necessary, refer to procedure CRT15.

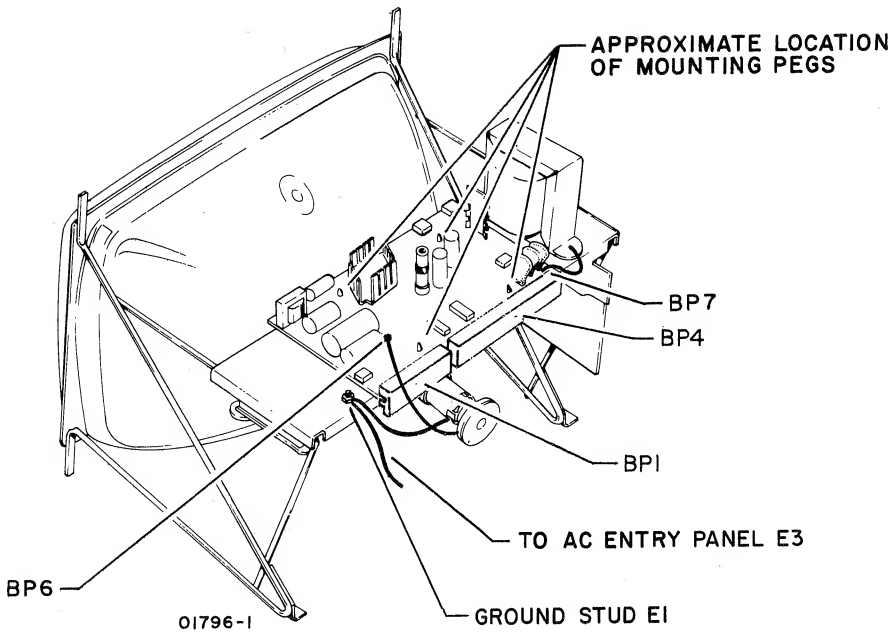


Figure CRT5. Video Module's CRT Monitor PC Board Connections

Procedure CRT6 — Removing Video Module

To remove video module, refer to figures CRT5, and CRT6 and perform the following:

1) Turn crt power off and disconnect ac power cord.

2) Disconnect connector BP1 and ground wires from E1.

3) Disconnect connector BP2 from J2 of capacitor board. BP2 goes to +15-V dc regulators mounted vertically on large heat sink on side of video module (figure CRT6).

4) Disconnect connector BP3 going to Intensity control on front panel.

5) Loosen two screws and remove four screws as shown in figure CRT7. Slots in bottom two frame brackes, which mount on bezel, allow just loosening those two screws.

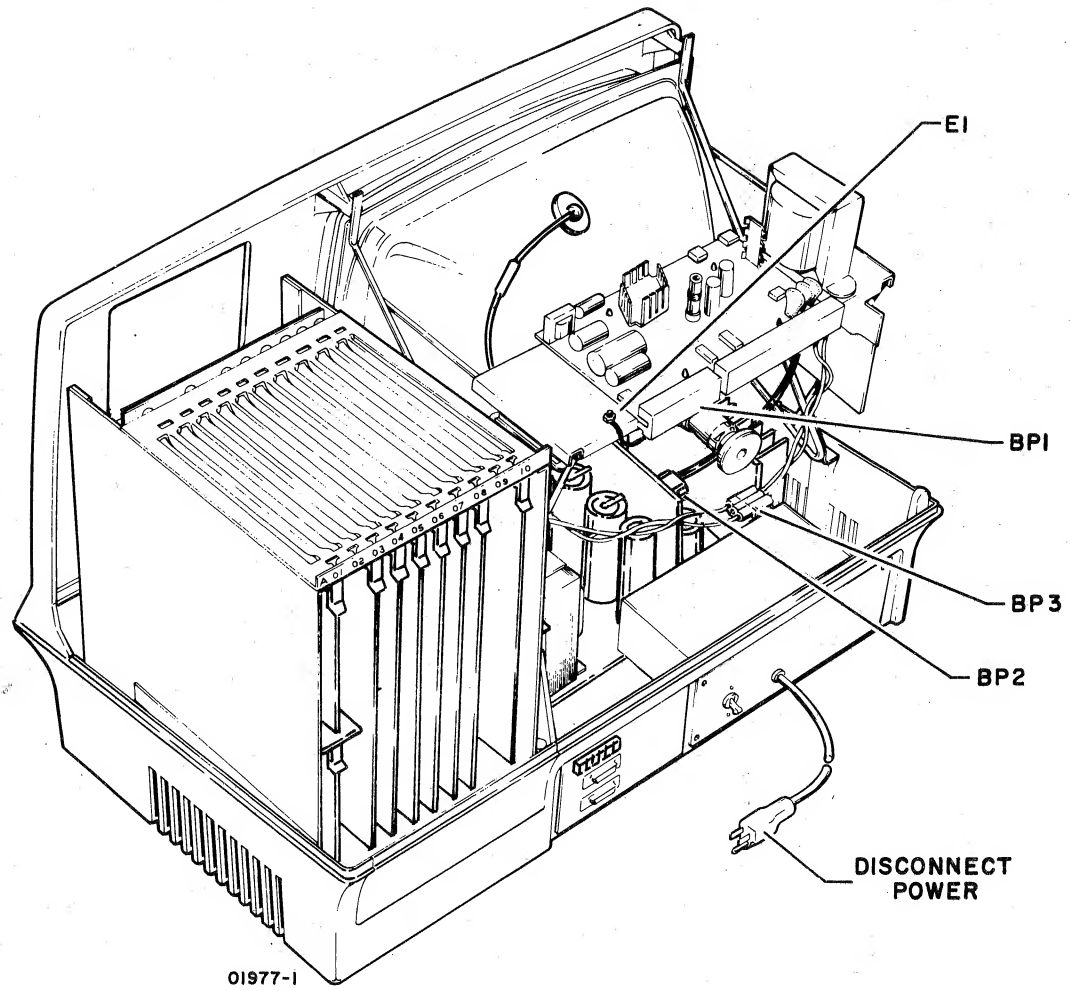


Figure CRT6. Video Module Connector Removal

WARNING

Use extreme care when handling TV module because rough handling can cause crt to implode with tremendous force resulting in severe injury. Do not nick or scratch glass or subject it to any undue pressure during replacement. When handling crt, always wear safety goggles and heavy gloves for protection.

6) Grasp video module on both sides of rod chassis and carefully withdraw entire module from cabinet (see figure CRT8). Check to see that neck of crt or mounting frame is not caught on cabling.

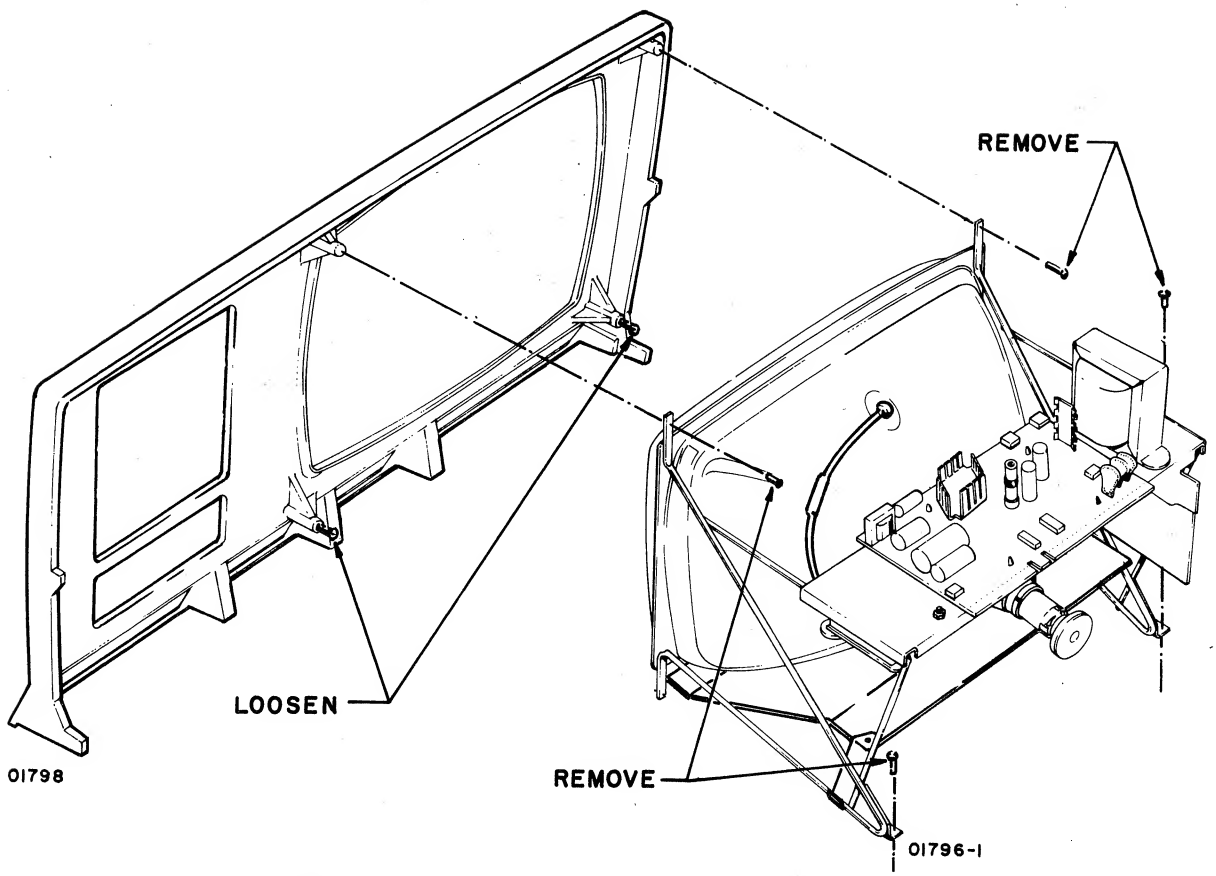


Figure CRT7. Video Module Mounting Screws

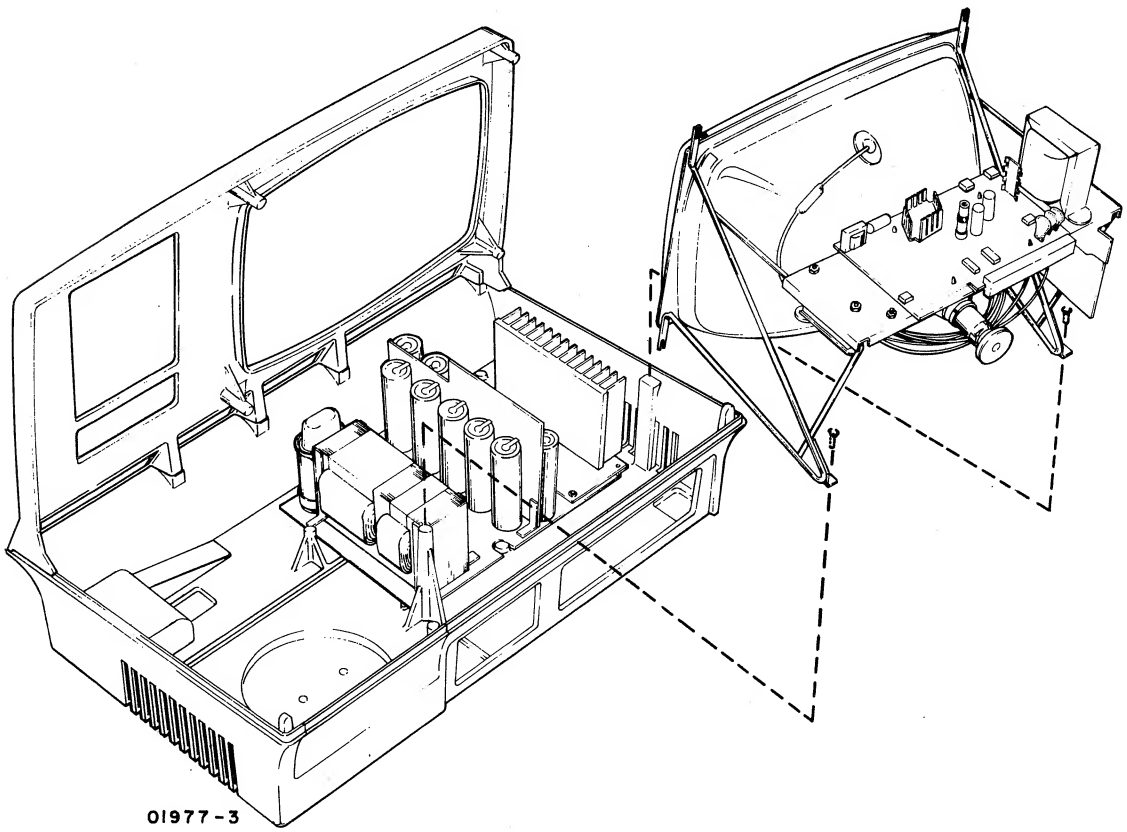


Figure CRT8. Video Module Removal

To install video module, perform the following:

7) Verify left-bottom and right-bottom screws are both partially screwed into mounting supports on bezel (figure CRT9).

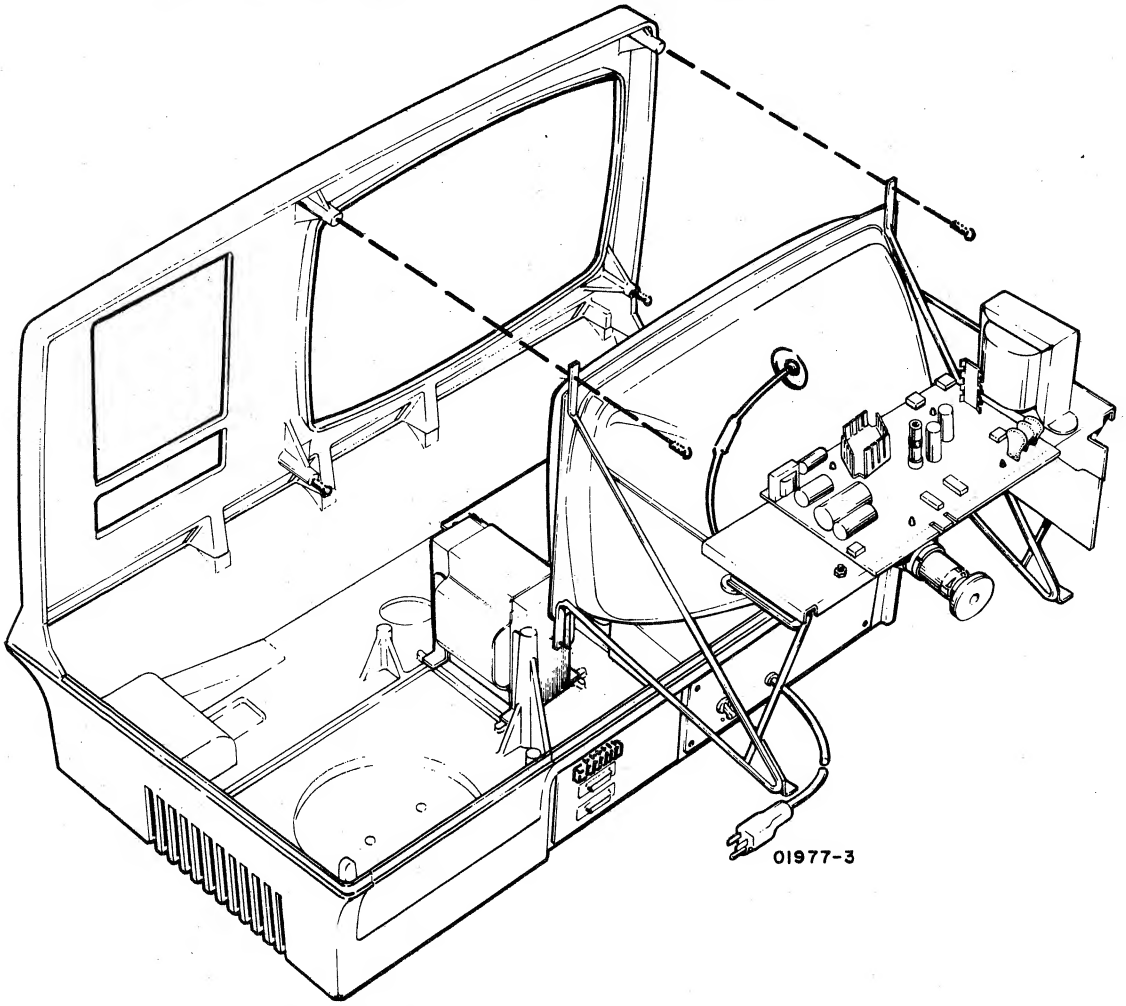


Figure CRT9. Video Module Installation

8) With video module in both hands, lower module into cabinet until slotted support in front fits over screws inserted partially in mounting (step 7).

9) Carefully steady module with one hand and insert top-left and top-right screws with other hand.

10) Tighten two top screws just snug. Do not overtighten.

11) Insert two cabinet screws which hold back of module in place. Do not tighten.

12) Tighten lower-left and lower-right screws just snug. Do not overtighten.

13) Tighten back two screws just snug. Do not overtighten.

14) Connect PC board BP1 connector and plug in connector BP2 from +15-V dc regulator to J2 of capacitor board. Also connect BP3 to INTENSITY control and three ground wires to E1.

15) Check that all other connectors (tube socket, BP4, BP5, and transformer lead into anode) are plugged in or attached correctly.

Procedure CRT7 — Replacing Cathode-Ray Tube

To replace crt, perform the following:

1) Turn power off and disconnect ac power cord from site power outlet.

2) Refer back to procedure CRT3, and perform step 3.

3) Remove video module from cabinet (see procedure CRT6, steps 1 through 6).

4) Loosen screw on rear leg of video shield that is beneath bell of crt and maneuver shield from rod chassis of video module.

5) Pull crt tube socket carefully from end of crt neck (see figure CRT10). Do not remove vinyl keyguide, which should be in position over end of tube for protection when socket is removed. During installation, keyguide assures that socket is correctly positioned.

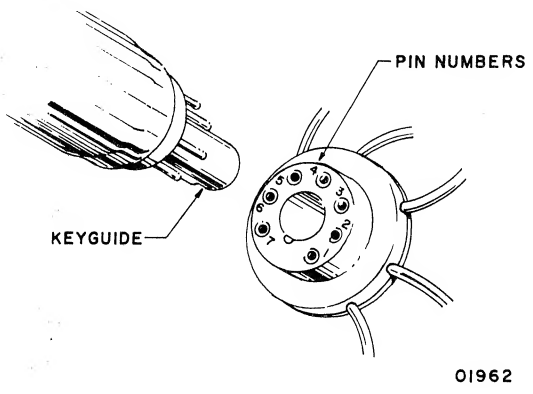


Figure CRT10. CRT Socket Removal

WARNING

Use extreme care when handling TV module because rough handling can cause crt to implode with tremendous force resulting in severe injury. Do not nick or scratch glass or subject it to any undue pressure during replacement. When handling crt, always wear safety goggles and heavy gloves for protection.

6) Using screwdriver, loosen screw in clamp which holds yoke in place (see figure CRT11).

7) After screw is loosened, gently slide yoke, ground clip, and shielding sleeve (which is between crt neck and yoke) back on crt neck to ensure it is loose enough for later removal.

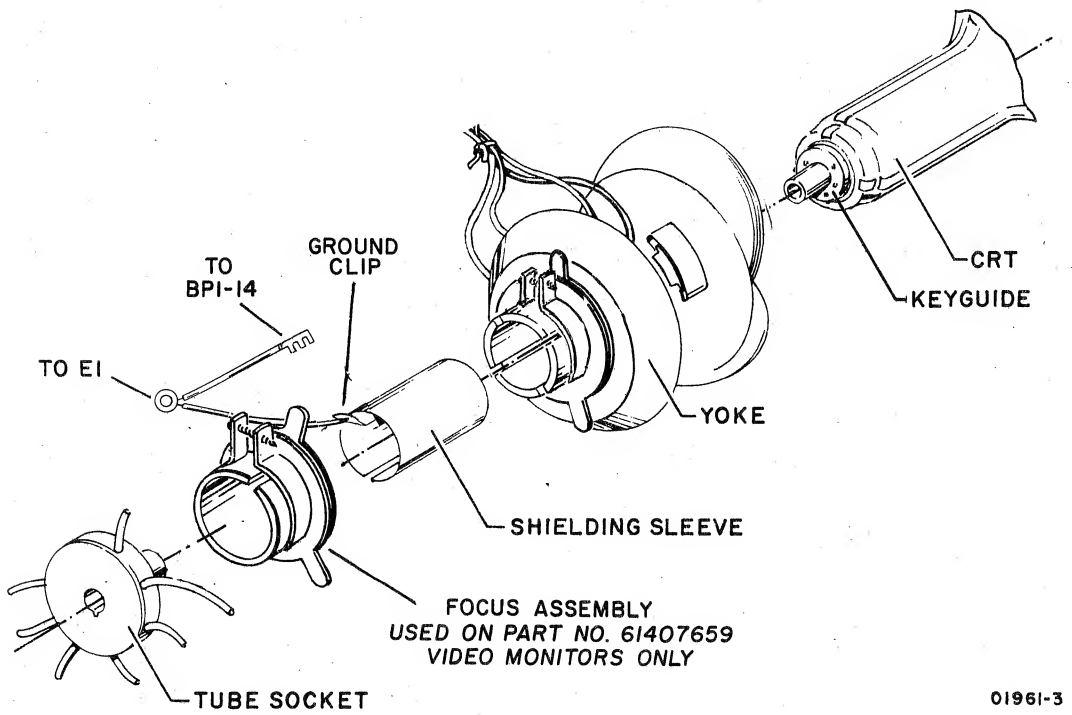


Figure CRT11. CRT Yoke Assembly

8) Remove four hex-head nuts which hold crt mounting plate to rod chassis of video module being careful that crt does not slip or fall when last screws are removed.

WARNING

Never allow crt to rest on or be supported by its neck.

9) Support crt neck with one hand and carefully remove yoke with other hand.

10) Withdraw crt carefully from rod chassis of video module. Place crt facedown on clean, soft cloth covering flat, stable surface (bench), with neck of crt pointing upward.

11) Remove replacement crt from shipping carton and place on clean, soft cloth covering flat, stable surface, facedown with neck pointing upward.

12) Place bad tube carefully into shipping carton and secure for shipment.

13) Without resting crt on its neck, position crt for mounting on video module chassis (neck is carefully inserted into chassis frame to vicinity of yoke).

14) Fasten crt mounting plate to rod chassis with four hex-head nuts.

15) Position shielding sleeve on neck of crt (figure CRT12) and slide yoke forward over sleeve until seated against tube.

16) Install focus assembly on neck of crt (over shielding sleeve) and butted up against yoke.*

17) Install crt ground clip under shielding sleeve and tighten the yoke and focus assembly clamps.* Do not overtighten.

18) Assure that keyguide is in place over pins on end of crt. Keyguide is illustrated in figures CRT10 and CRT11.

19) Carefully position tube socket over end of crt and gently push socket into place so pins enter socket without bending.

20) Reinstall video shield to rod chassis of video module and secure by tightening screw on rear leg of shield.

21) Install video module into cabinet. Refer to steps 7 through 15, procedure CRT6.

22) Before power is applied to device, insert high-voltage lead from high-voltage transformer into crt anode.

23) Perform monitor adjustments, procedure CRT8.

---

*Focus assembly applies to part number 61407659 video monitors only.

Procedure CRT8 — Monitor Adjustments

To adjust the crt monitor for correct video display, perform the following steps:

1) If this alignment is the result of yoke having been removed or a new crt installed, check that high-voltage lead was reinstalled, PC board connectors are reconnected, and plug BP2 from +15-V dc regulators to power supply is attached.

2) Place switch 0 on the maintenance panel to the right (logical 1 position) to disable a downline load and to cause quicklook tests 001 through 005 to be performed.*

3) Turn crt power on. Wait 30 seconds.

WARNING

With power applied, high voltage is present at the high voltage transformer and crt anode lead. Exercise caution when performing adjustments.

4) In the case of the Ticketron application of the display terminal, a full display of D's should appear on the crt at the completion of quicklook test 005. If display does not appear:

   a) Turn INTENSITY knob clockwise until raster appears.

   b) If no raster, go to sheet 1, table CRT1, DDLT for Display Terminal.

   c) Increase video gain by turning contrast control (figure CRT13) fully clockwise. Characters should appear on display.

   d) If no video appears, go to sheet 1 of table CRT1, DDLT for Display Terminal.

   e) When characters can be made to appear on display, proceed with adjustment steps.

5) Adjust INTENSITY control until raster is just invisible in normal room lighting but dimly visible in the dark (shaded with hands).

---

* For the Ticketron application of the display terminal, this action done in conjunction with a power-on is required to disable a downline load (autoload), and to cause a full display of a character to appear on the crt. For an application other than Ticketron, different action may be required to accomplish this.

Tilt Adjustments:

6) Enter a full display of D characters.

7) Check if full display of D characters is tilted on screen. If tilted do steps 7a, 7b, 7c, 7d.

   a) Turn power off and loosen clamp screw (nearest crt) which holds yoke in position on neck of crt.

   b) Reapply power and observe full display of D characters.

   c) Rotate yoke both ways until the display characters are no longer tilted.

   d) Turn power off and tighten yoke clamp. Do not overtighten.

Centering Adjustment:

8) Check if full display of D characters is centered correctly on the screen. If not, adjust the yoke centering tabs (figure CRT12) until display is centered. Initial setting of the centering tabs should be 180° apart.

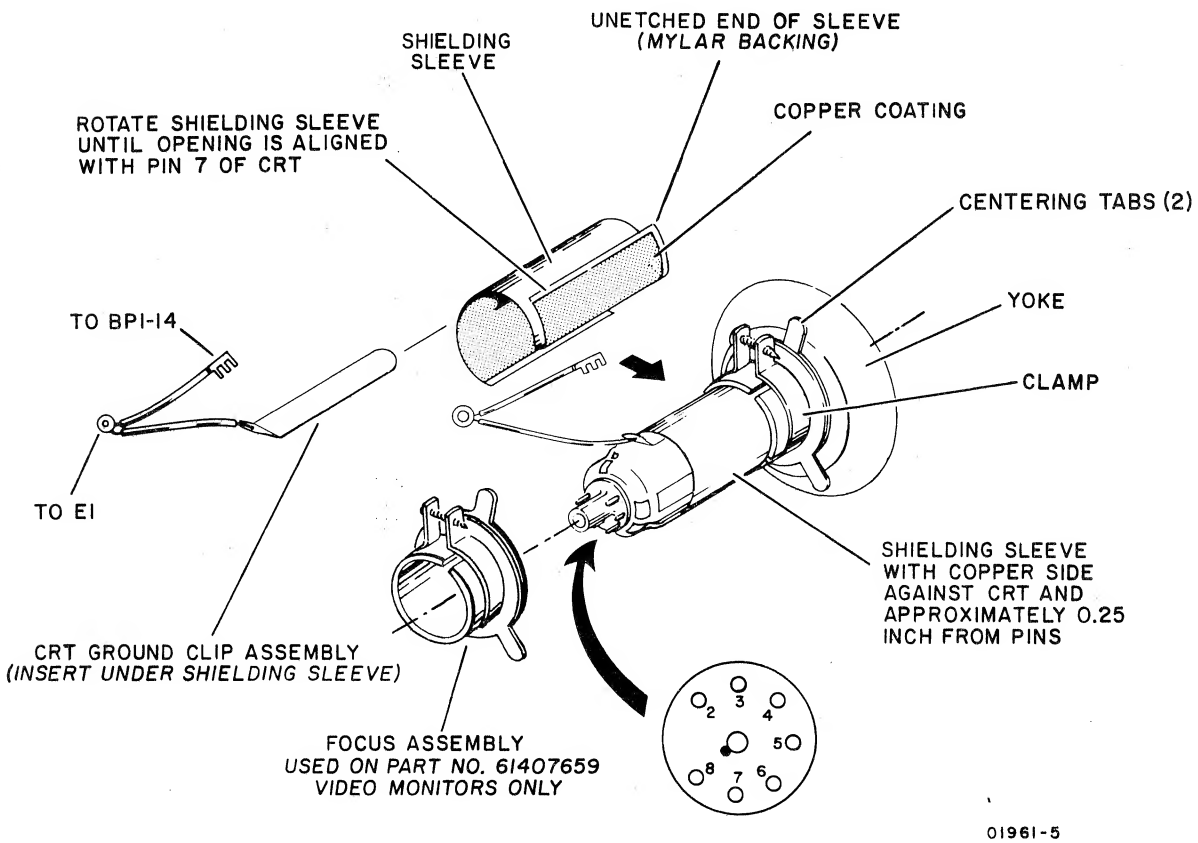


Figure CRT12. Shielding Sleeve Positioning

Linearity Adjustments:

9) Observe the D characters on the screen. Are D characters in leftmost column and rightmost column of sufficient vertical height (similar to D characters in center of screen)? If not, adjust the vertical linearity potentiometer (figure CRT13). Are D characters on left side of screen distorted while right side is not? If so, adjust horizontal linearity sleeve (shielding sleeve) per step 10.

10) Check that shielding sleeve on neck of crt is in place approximately as shown in figure CRT12. If shielding sleeve is not correctly positioned, left side of screen is distorted while right side is not. Pushing shielding sleeve toward the yoke has the effect of distorting left portion of screen; if pushed too far forward, the left hand side of screen is blacked out.

NOTE

Horizontal linearity sleeve adjustment affects the horizontal width. Refer to Size Adjustments (step 14) and perform both the horizontal linearity and horizontal size adjustments in iterative fashion.

11) After yoke and shielding sleeve are correctly adjusted and crt ground clip is under sleeve, carefully, without using force, tighten clamp screws on yoke and focus assembly until clamps are snug.*

Size Adjustments:

12) Enter a full display of D characters.

13) Adjust vertical height potentiometer (figure CRT13) until rectangle of display characters is 5.25 ± 0.1 inches in height.

14) Adjust horizontal width coil (figure CRT13) to obtain a display 8.0 ± 0.1 inches wide. Use a 3/32-inch nonmetallic hex driver.

Focus Adjustments:

15) Set the contrast control to its maximum clockwise position (figure CRT13).

16) Enter a full display of D characters.

17) Adjust the front panel INTENSITY control so that the raster (background scan lines) just disappear and a normal viewing intensity is obtained.

---

*Focus assembly applies to part number 61407659 video monitors only.

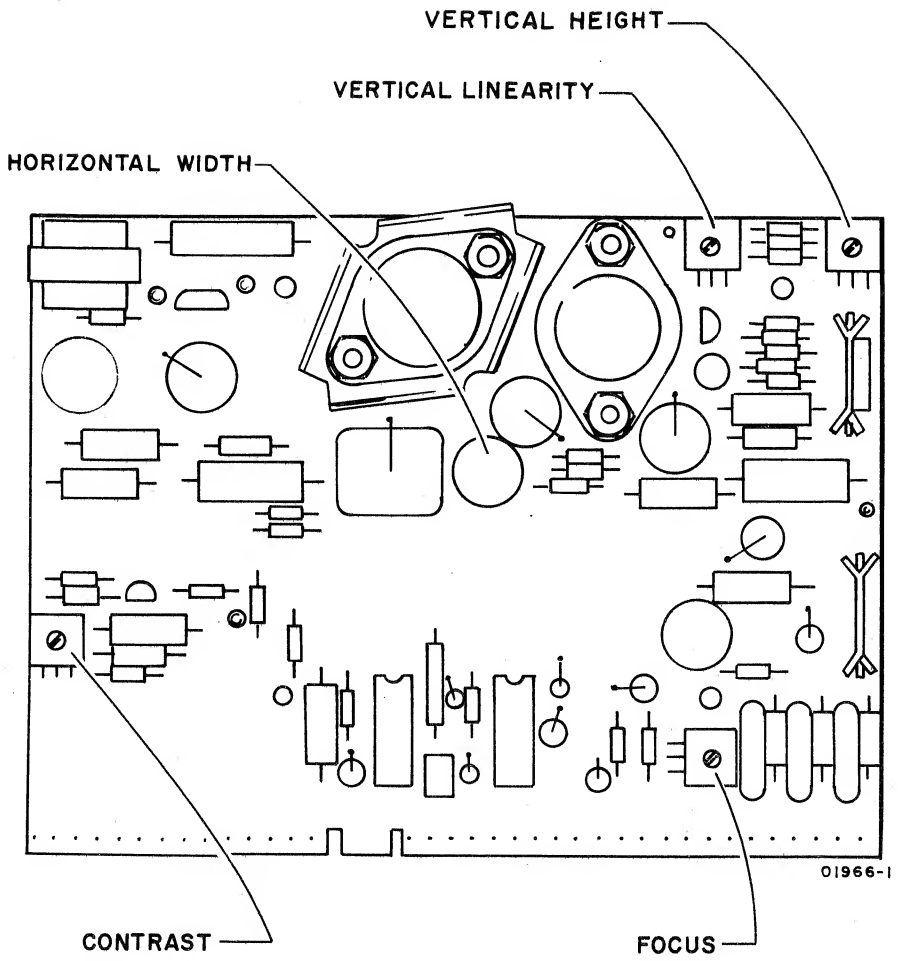


Figure CRT13. Monitor PC Board Adjustments

18) Adjust the focus control (figure CRT13) to obtain the best resolution of characters throughout the entire display.

19) Adjust the focus magnet rings* (figure CRT14) to reduce to a minimum any tails or halos visable on the characters. Especially those characters located in the corners of the display.

20) If necessary, repeat steps 17, 18, and 19 to obtain best possible character resolution over entire screen. Particular characteristics to be observed are:

- Dot size and shape
- Spacing between vertical strokes
- Character separation
- Tails or smearing

*Focus ring assembly applies to part number 61407659 video monitors only.

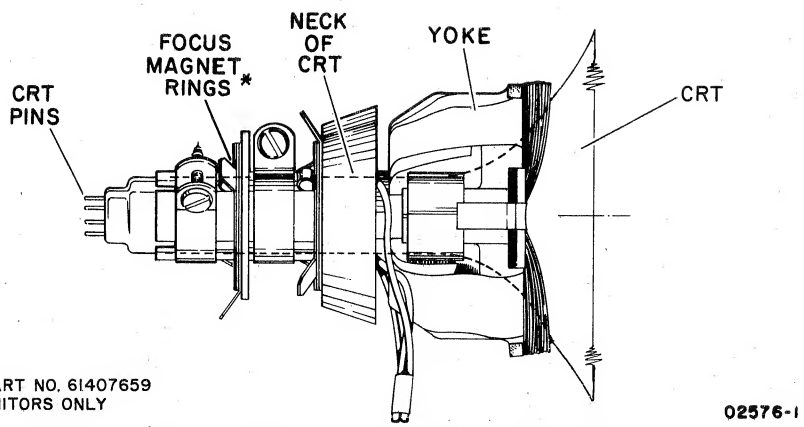


Figure CRT14. Focus Magnet Rings

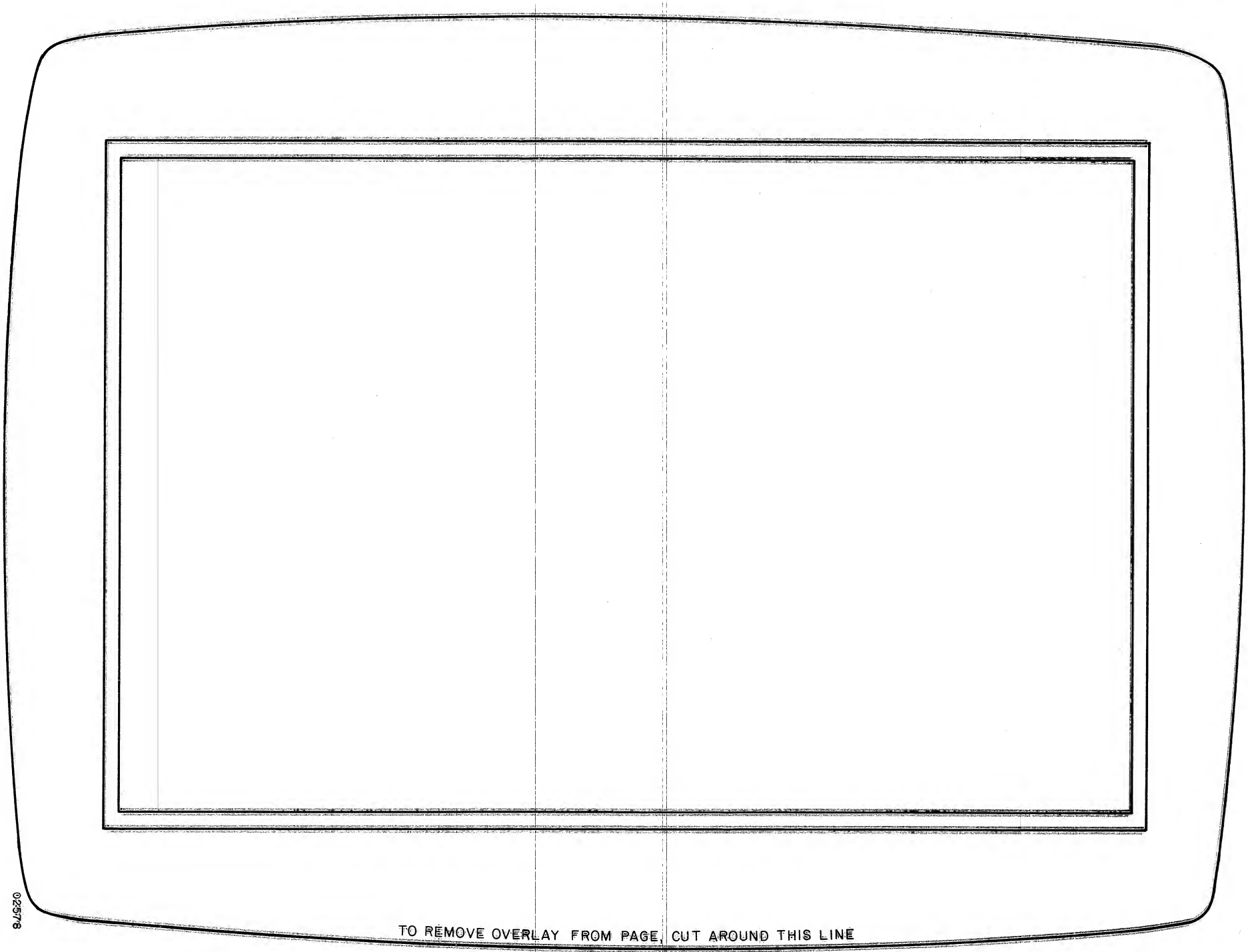
Geometric Distortion Checks and Adjustments:

In the following steps, the rectangle of displayed characters is checked for barrel/pincushion distortion. If the check indicates that correction is required, the following items will be needed:

Items	Number required
Wooden or plastic rod, preferably 1/4-inch in diameter and 12-inches long	1
Masking tape, preferably 1/4-inch wide	—
Adhesive, part number 51004063 (tube)	—
2.0-gauss (yellow) correction magnet, part number 51917051	As required
3.0-gauss (silver) correction magnet, part number 51917052	As required
4.0-gauss (red) correction magnet, part number 51917053	As required
5.7-gauss (green) correction magnet, part number 51917054	As required

21) Enter a full display of D characters.

22) Remove figure CRT15 (plastic overlay) from manual and cut as noted on the figure to remove the sheet. If done properly, the overlay left after cutting, will fit within the crt bezel and lay flatly on the screen.



TO REMOVE OVERLAY FROM PAGE, CUT AROUND THIS LINE

TO REMOVE OVERLAY FROM PAGE, CUT AROUND THIS LINE

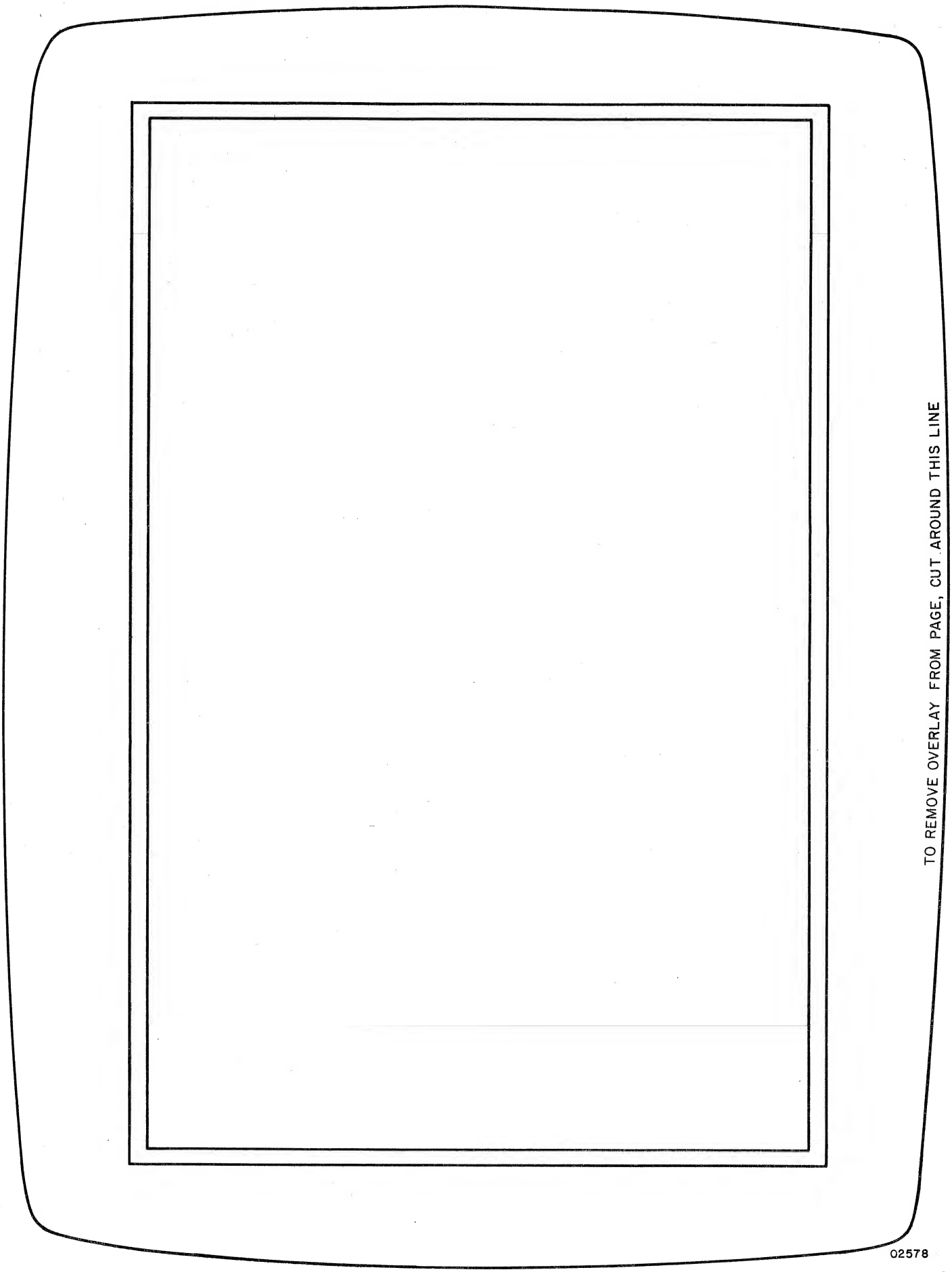


Figure CRT15. CRT Raster Overlay

23) Using masking tape, fasten the overlay over the screen (figure CRT16).

24) Observe the display to see if perimeter of displayed characters protrude either inside or outside the double line of the overlay. Ideally, the perimeter should align, within the double lines of the overlay. If a horizontal or vertical edge deviates more than ±0.05 of an inch from this ideal rectange, the display is considered to be geometrically distorted and correction through performance of the following steps is required. Otherwise proceed to step 32.

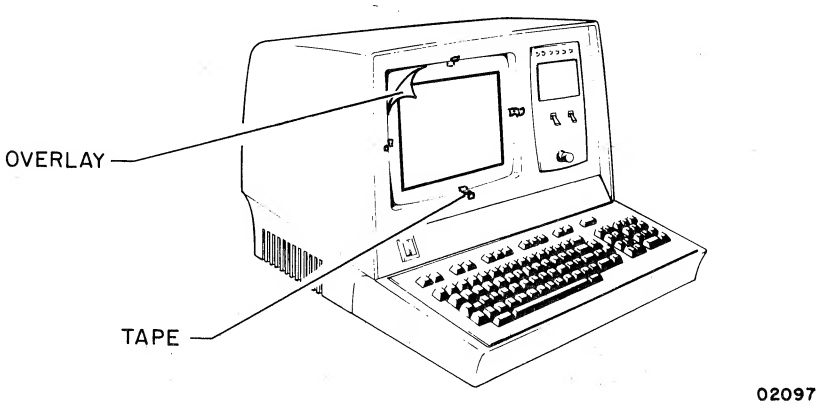


Figure CRT16. Applying Plastic Overlay to CRT Screen

25) By referring to figure CRT17 and the display, determine whether the perimeter edge requiring correction is caused by a barrel or a pincushion distortion.

26) Using 1/4-inch wide masking tape, fasten a 2.0-gauss (yellow) correction magnet (part number 51917051) to the end of wooden or plastic rod. In doing this, position the magnet so its yellow colored end is pointed away from side of the rod.

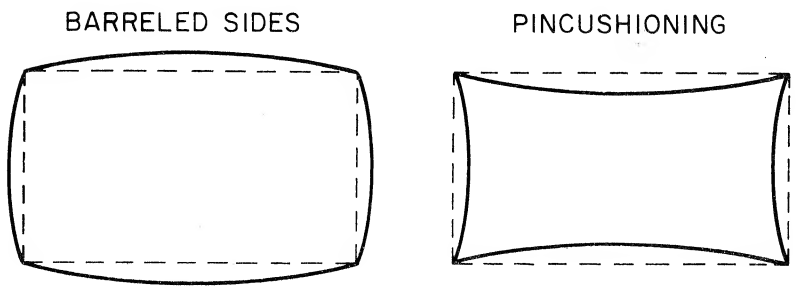
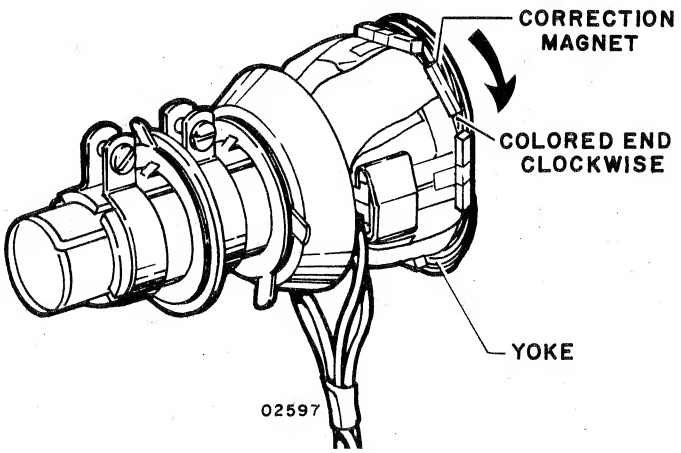


Figure CRT17. Identifying Geometric Distortion

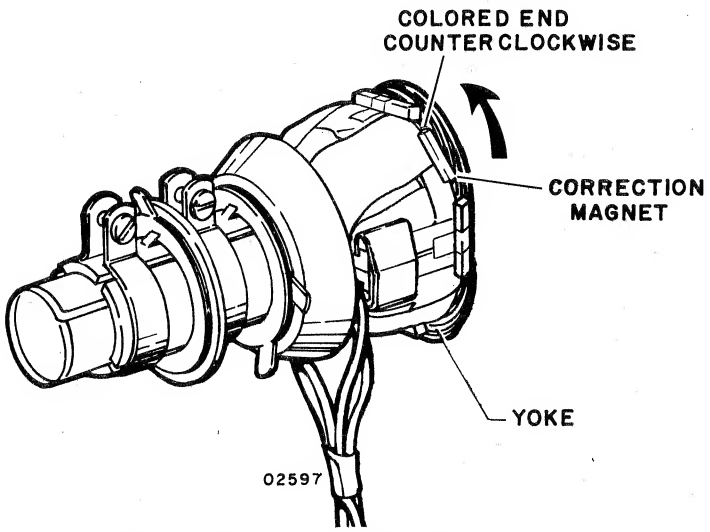
WARNING

Keep magnet away from high-voltage transformer and crt anode lead.

27) From the rear of the display terminal maneuver the magnet on the rod along and up-down the side of the crt yoke coil which corresponds to the perimeter edge requiring correction, and monitor the effect on the display. While doing this, attention must be given as to what direction the colored end of the magnet is pointed. A magnet with its colored end pointed clockwise has the effect of pulling the edge out. A magnet with its colored end pointed counterclockwise has the effect of pushing the edge in. Refer to figure CRT18.



MAGNET ADDED TO YOKE TO CORRECT PINCUSHIONING (SEE NOTE)



MAGNET ADDED TO YOKE TO CORRECT BARRELING (SEE NOTE)

NOTE: IF BOTH BARREL AND PINCUSHION DISTORTION WERE BEING CORRECTED, THE COLORED END OF THE CORRECTION MAGNETS WOULD BE PLACED ON THEIR RESPECTIVE SIDE OF THE YOKE AND THE RESULT WOULD BE A MIXTURE OF THE TWO EXAMPLES SHOWN.

Figure CRT18. Typical Positioning of Correction Magnets on Yoke

28) If the perimeter edge requiring correction can not be straightened by the action taken in step 27, perform the following as applicable and repeat the correction.

   a) If the 2.0-gauss magnet causes an overreaction, break the magnet in half.

   b) If the 2.0-gauss magnet causes no, or not enough, reaction, use a magnet with more strength (such as 3.0-gauss, silver, correction magnet). In some cases, a combination of two magnets may be required.

29) When the desired correction is obtained, note the magnet position and turn crt power off.

30) Unfasten magnet from rod and use adhesive (part number 51004063) to secure the magnet to the yoke coil where correction was achieved. Make sure that the colored end of magnet is pointed in the proper direction. It may be necessary to use masking tape to hold magnet in place during adhesive cure time.

31) If required, correct other perimeter edges in the same manner. Remove masking tape, if used, from magnets when adhesive has cured. Remove plastic overlay from crt screen and save it for possible future use.

32) Return maintenance panel switch 0 back to the left (logical 0 position).

Procedure CRT9 — Replacing Yoke on CRT

To remove yoke from neck of crt, perform the following:

1) Turn crt power off.

2) Disconnect ac power cord from site power outlet.

WARNING

Use extreme care when handling TV module because rough handling can cause crt to implode with tremendous force resulting in severe injury. Do not nick or scratch glass or subject it to any undue pressure during replacement. When handling crt, always wear safety goggles and heavy gloves for protection.

3) Connect heavily insulated wire to ground first and then, while carefully lifting rubber anode cover, discharge surface under rubber cover (including anode terminal end) by sliding end of grounded wire under rubber cover and into anode hole of cathode-ray tube.

4) Pull connector BP4 off edge of crt monitor PC board. Connector BP4 is largest connector with wires leading to yoke. Also disconnect ground wire, connected to crt ground clip assembly, from E1.

5) Disconnect flag terminals 9, 10, 18, and 19 from BP4 connector (four wires leading to yoke) by inserting small end of paper clip into top of connector in space available between flag terminal and insulation (see figure CRT19) and then pulling out wire gently from bottom of connector. (Flag terminal end has a wedge-type spring clip which, when released by paper clip, permits flag terminal to be withdrawn with wire from connector.)

6) Pull crt tube socket carefully off end of crt (figure CRT20). Do not remove vinyl keyguide.

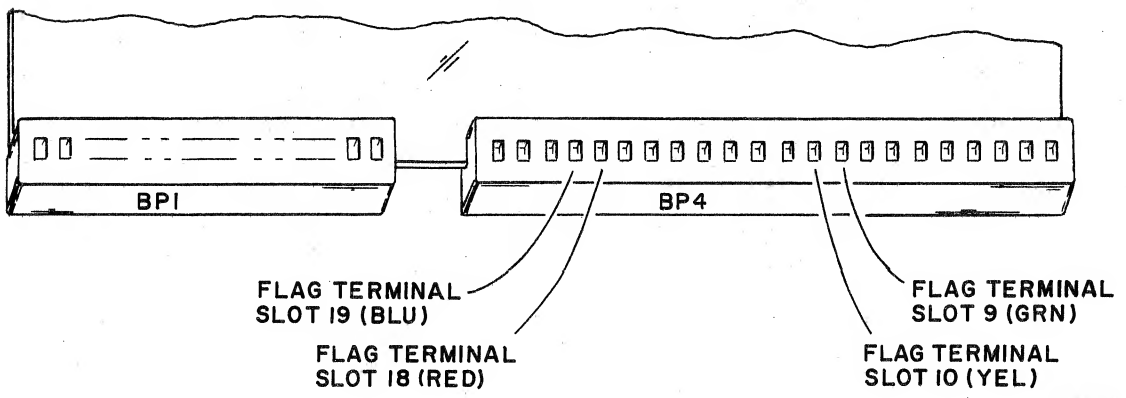


Figure CRT19. Removing Flag Terminals

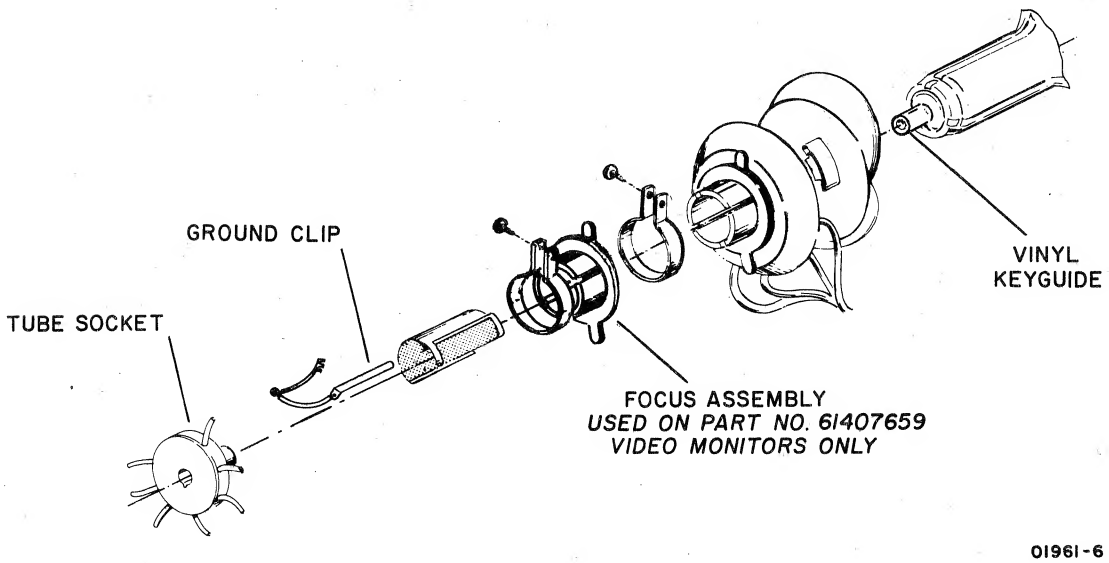


Figure CRT20. CRT Tube-Socket Removal

7) Loosen clamps which hold yoke and focus assembly in place with screwdriver (figure CRT21).*

8) After clamps are loosened, gently slide crt ground clip back until yoke and focus assembly can be removed from device.*

WARNING

Never tighten clamp which holds yoke on neck of crt more than enough to hold yoke in place. If tightened excessively, it is possible to break neck of crt. Wear protective goggles and heavy gloves for protection.

To install yoke perform the following:

9) Position sleeve approximately as shown in figure CRT22, but with opening in sleeve facing downward.

10) Position yoke over sleeve with wires downward. Red and green wires on the left and yellow and blue on the right as viewed from rear of crt.

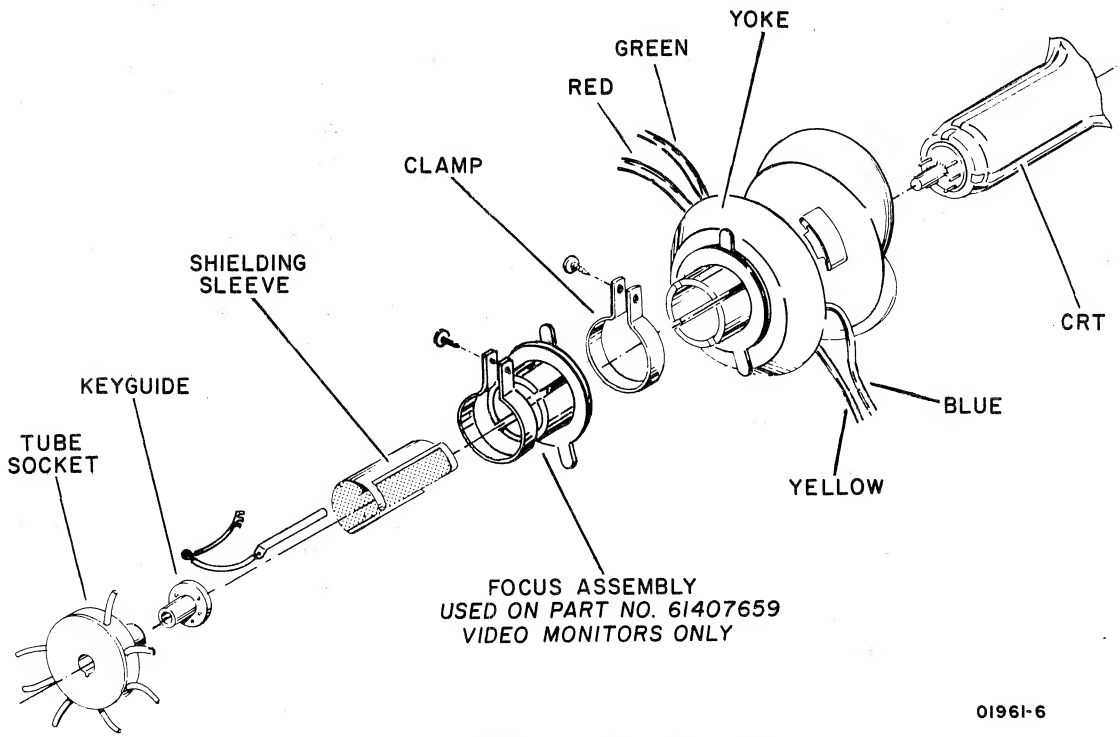


Figure CRT21. Yoke Assembly

* Focus assembly applies to part number 61407659 video monitor only.

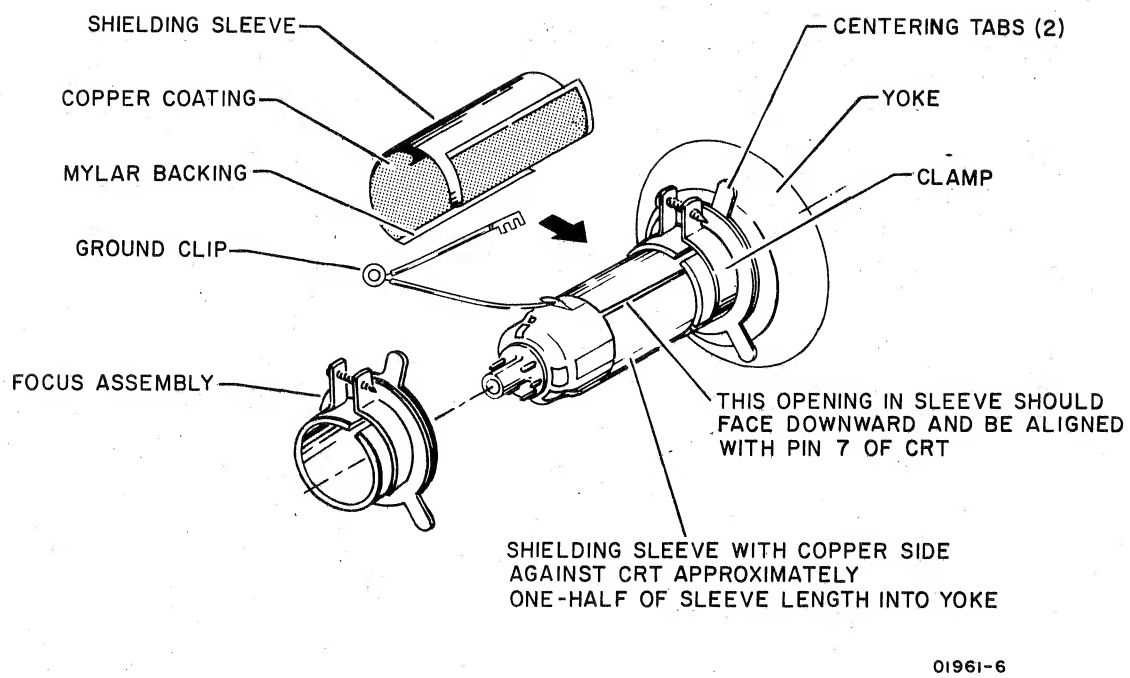


Figure CRT22. Positioning Shielding Sleeve

11) Position focus assembly over sleeve and butt up against yoke assembly.*

12) Insert crt ground clip underneath sleeve.

13) Tighten yoke and focus assembly clamps.* Do not overtighten.

14) Plug crt tube socket carefully on pins of crt, making sure guide matches slot in socket.

15) Insert flag terminals into BP4 connector:

   a) Push green wire terminal into slot (pin location 9) until wedge-like clip locks itself in place.

   b) Push yellow wire into slot 10.

   c) Push red wire into slot 18.

   d) Push blue wire into slot 19.

16) Plug BP4 connector onto edge of crt monitor PC board and reconnect ground wire from ground clip to E1.

---

* Focus assembly applies to part number 61407659 monitors only.

17) Verify that rear panel circuit breaker is in the Down (off) position and plug ac power cord into site power outlet.

18) Place maintenance panel switch 0 to the right (logical 1 position) to disable a downline load and to cause quicklook tests 001 through 005 to be performed.* Turn power on.

    In the case of the Ticketron application of the display terminal, a full display of D's should appear on the crt at the completion of quicklook test 005. If display does not appear, go to sheet 1 of table CRT1, DDLT for Display Terminal. After display appears, go to step 19.

19) Observe the displayed characters and perform the applicable monitor adjustments (procedure CRT8) to obtain acceptable display quality.

WARNING

Do not overtighten clamps on crt.

20) Upon completion of monitor adjustments, tighten screws on crt clamps so yoke and focus assembly cannot move.**

21) Return maintenance panel switch 0 back to the left (logical 0 position).

Procedure CRT10 — Replacing Vertical Choke

To replace vertical choke (figure CRT23), perform the following:

1) Turn crt power off and disconnect ac power cord from site power outlet.

2) Disconnect BP4 (longest) connector on crt monitor printed-circuit board. BP4 connector is on printed-circuit board next to vertical choke and has two flag terminals (pins 6 and 7) attached to wires leading to vertical choke.

---

* For the Ticketron application of the display terminal, this action done in conjunction with a power-on is required to disable a downline load (autoload) and to cause a full display of a character to appear on the crt. For an application other than Ticketron, different action may be required to accomplish this.

** Focus assembly applies to part number 61407659 video monitors only.

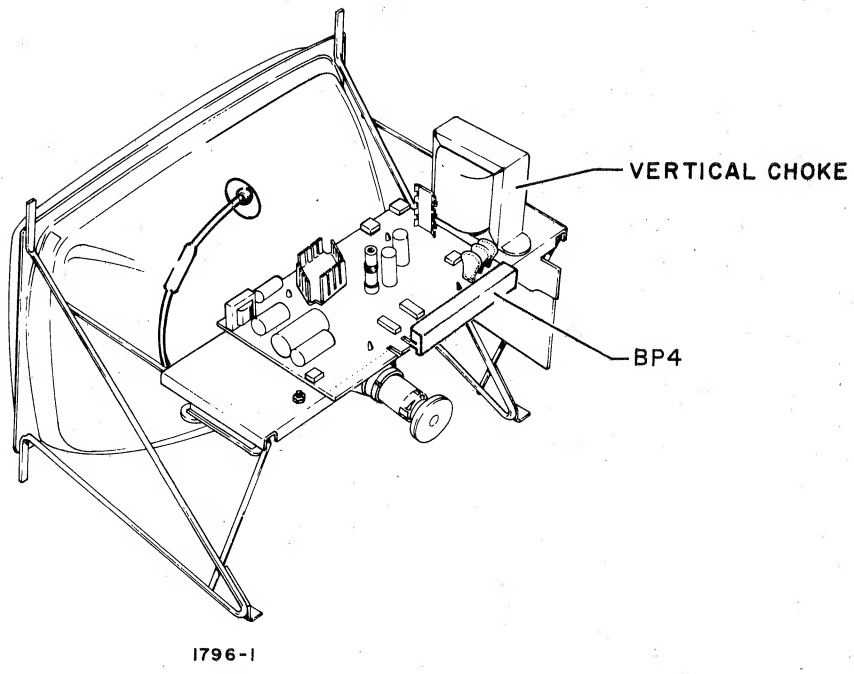


Figure CRT23. Vertical Choke

3) Remove flag terminals 6 and 7 by inserting end of a small paper clip in space provided between installed flag terminal and connector insulation. Paper clip releases wedge-like friction lock on terminal and permits entire terminal to be removed out from bottom of connector.

4) Remove two hex nuts holding vertical choke to chassis.

5) Lift grounding wire from rear mounting screw, but do not remove from printed-circuit board.

6) Lift vertical choke from chassis.

7) Position new choke in place over two mounting screws so two wires are on side nearest printed-circuit board.

8) Connect grounding wire to rear mounting screw and fasten with hex nut.

9) Fasten other hex nut to front screw.

10) Insert flag terminals into slots 6 and 7 of BP4 connector until wires are locked and secured.

11) Connect BP4 connector to crt monitor printed-circuit board.

Procedure CRT11 — High +5-V Voltage Check

To determine if the input power circuit breaker is tripping because of a high +5-V dc condition, perform the following steps:

1) With input ac power off (input power circuit breaker in Down position), connect a voltmeter to measure +5 V dc at the voltage regulator in chassis location B01. Refer to figure CRT24.

2) Place the input power circuit breaker in the on (Up) position and observe voltmeter for a high +5-V reading.

   The delay time between sensing an overvoltage condition and tripping the breaker should allow enough time to obtain this voltage reading. If unable to determine if the voltage is +5.5 V or greater in this manner back off the +5-V adjust potentiometer (counterclockwise) and recheck.

3) If voltage was high, attempt to readjust the regulator for correct +5-V dc tolerance per procedure CRT12. Replace the regulator if faulty per procedure CRT18.

4) For replacement of the input power circuit breaker refer to procedure CRT16.

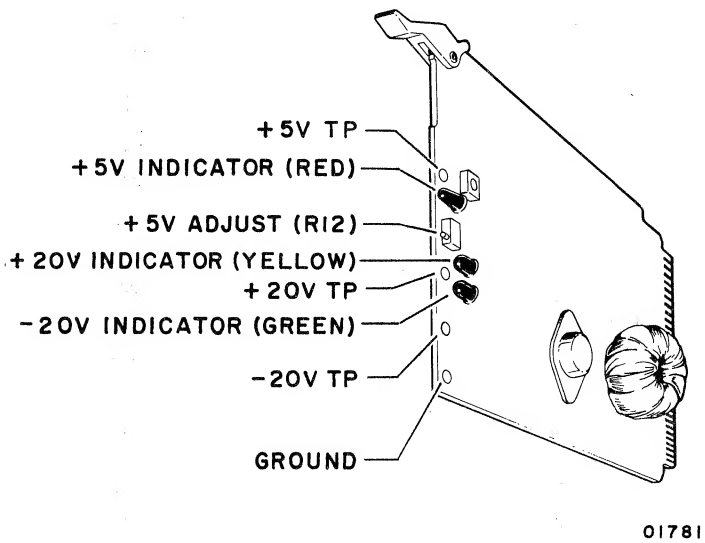


Figure CRT24. +5-Volt Regulator Test Points

Procedure CRT12 — +5-V Voltage Regulator Adjustments

To adjust the +5-volt regulator in the logic chassis, perform the following steps.

1) Set voltmeter to read +5 V dc.

2) With power applied, measure between the ground and +5-V test points on the voltage regulator in chassis location B01. Refer to figure CRT24.

3) Adjust the potentiometer at the board edge (R12) for a voltage of +5 ± 0.25 volts.

   a) The regulator in chassis location A01 of CC617-A model is a slave of regulator B01 and does not require the +5-V adjustment.

   b) If the +5-V output rises to 5.6 V or greater, a zener diode will conduct and issue a signal to the power supply which will trip the input power circuit breaker and shut down all power to the display.

Procedure CRT13 — Measuring Voltages at CRT Monitor PC Board

To measure +465 V dc, perform the following:

1) Set voltmeter to measure +465 V dc.

2) Remove cabinet hood (two screws at rear of cabinet). See procedure CRT2.

3) Turn crt power on.

4) Connect black (-) lead from voltmeter to chassis ground.

WARNING

Do not touch anything with hands and use only one hand at a time to connect leads to test points.

5) Connect red (+) lead to resistor R8A, see figure CRT25.

6) Check that voltmeter indicates +465 V dc ±47 V dc.

7) If within tolerances, go to step 8; if not, go to sheet 4 of table CRT1, DDLT for Display Terminal.

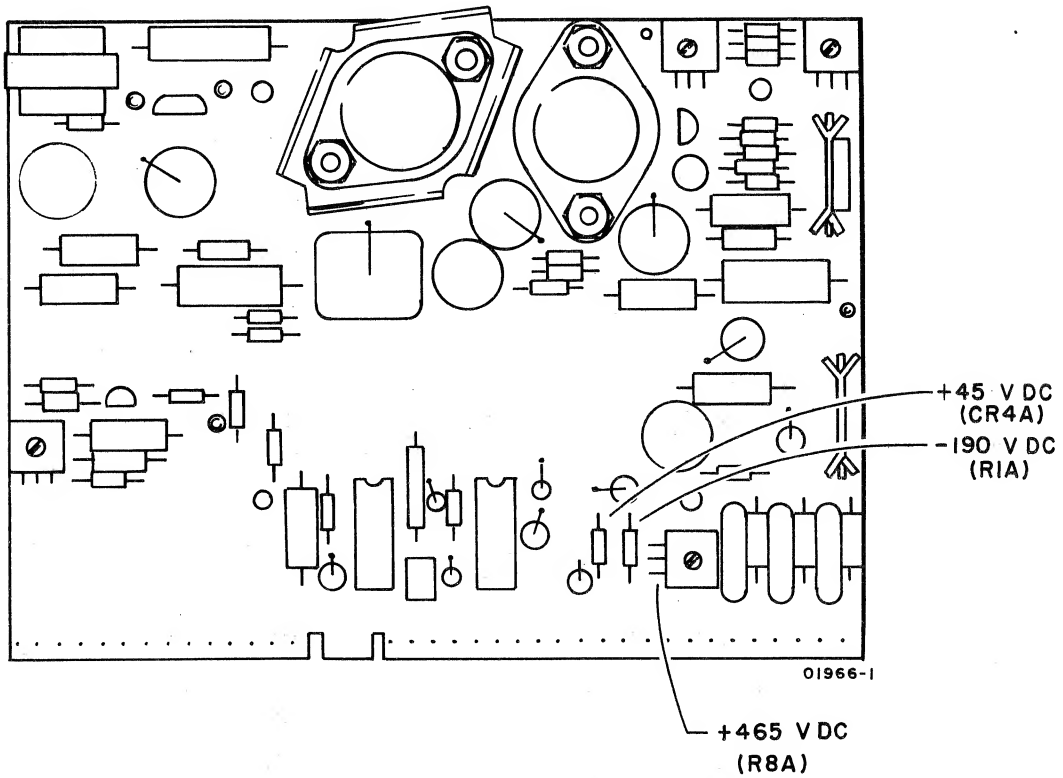


Figure CRT25. Test Points for +465, -190, and +45 V dc

To measure -190 V dc, perform the following:

8) Set voltmeter to measure -190 V dc.

9) Connect positive (+) lead to chassis ground. If voltmeter has separate switch for selecting -dc, reverse polarity, such as Simpson Model 250, connect common (black lead) to chassis ground and select -dc on meter.

10) Connect negative (-) lead to R1A (figure CRT25).

11) Check that voltmeter indicates -190 V dc ±25 V dc.

12) If reading is within tolerances, go to step 13; otherwise, go to sheet 4 of table CRT1, DDLT for Display Terminal.

To measure +45 V dc, perform the following:

13) Set voltmeter to measure +45 V dc.

14) Connect black lead to chassis ground.

15) Connect red(+) lead to diode CR4A (figure CRT25).

16) Check that meter indicates +45 V dc ±4.5 V dc.

17) If within tolerances, go to step 18; if not go to sheet 4 of table CRT1, DDLT for Display Terminal.

To measure +5 V dc and +15 V dc, perform the following:

18) Set voltmeter to measure +15 V dc.

19) Connect black (-) lead to chassis ground.

20) Connect red (+) lead to pin 8 of BJ4 (figure CRT26).

21) Check that meter indicates +15 V dc ±0.75 V dc. If not, regulator Q1 is defective.

22) Connect red (+) lead to pin 22 of BJ4.

23) Check that meter indicates +15 V dc ±0.75 V dc. If not, regulator Q2 is defective.

24) Connect red (+) lead to pin 16 of either IC (figure CRT26).

25) Check that meter indicates +5 V dc ±0.25 V dc.

26) If voltage checks are within tolerance, perform the next action of table CRT1, sheet 3. If voltages are not within tolerance go to sheet 4 of table CRT1, DDLT for Display Terminal.

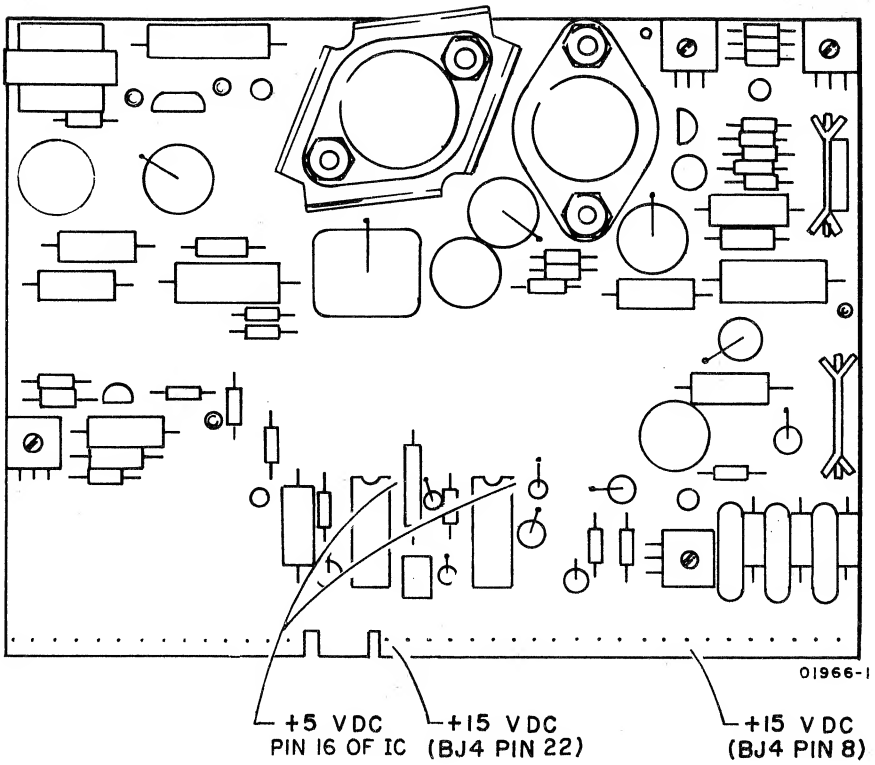


Figure CRT26. Test Pins for +5 and +15 V dc

Procedure CRT14 — Checking and Replacing Intensity Control on Display Panel

To check Intensity control, perform the following:

1) Turn crt power off and disconnect ac power cord from site outlet.
2) Set ohmmeter to X 1000 setting.
3) Attach one ohmmeter lead to center pin on top rear of Intensity control and the other lead to one of the other two pins.
4) Rotate Intensity control knob while holding leads to pins. Check that meter reads 0 ohm when Intensity is fully turned in one direction and 100 000 ohms when fully turned in the opposite direction. Replace Intensity control if unable to obtain correct results (steps 7 through 12 describe replacement).
5) Remove lead on outer pin and attach it to pin on other side of center pin. Keep other lead on center pin.
6) Rotate Intensity control knob as described previously (step 4) and observe meter for same readings. If unable to obtain correct results, replace Intensity control.

To replace Intensity control, perform the following:

7) Disconnect connector BP3 of control assembly.

8) Pull off knob to gain access to hex ringnut on front side of panel.

9) Remove hex ringnut using a 1/2-inch socket.

10) Withdraw old control assembly from unit.

11) Attach new control assembly to panel by inserting control post through hole in panel and screwing on hex ringnut from the front.

12) Connect connector BP3 to its mating connector.

Procedure CRT15 — Power Supply Voltage Checks

To determine power supply faults perform the following steps:

NOTE

No indicators are available on the power supply to indicate presence of voltages; however, indicators may be observed on PC boards in the logic, refer to table 6-1.

1) If all power is off, check that site power is available, ac power cord OK, internal power connectors seated correctly, and input power circuit breaker OK. If input power circuit breaker trips, perform procedure procedure CRT11.

NOTE

The application of input power can be determined by observing fan operation.

2) If only a red (+5 V) indicator is off on a +5-volt regulator (CC617-A model chassis locations A01 and B01; CC617-B model chassis location B01), replace the +5-V regulator board, procedure CRT18.

3) If a yellow (+20 V) or green (-20 V) indicator is off on the single +5-volt regulator of the CC617-B model or on both +5-volt regulators of the CC617-A model, check cable connections and replace power supply per procedure CRT21.

4) For the CC617-A model, check that the LEDs for individual voltage regulators on the ROM, processor, async I/F-2, and display/keyboard I/F* modules are lit (chassis locations 03, 06, 08, and 10, respectively). For the CC617-B model, check that the LEDs for individual regulators on the processor, async I/F-2, display/keyboard I/F*, and optional modem* module are lit (chassis locations 06, 08, 09, and 10, respectively). Replace the PC board if an indicator is off (procedure CRT18) and check cabling.

5) Check for correct voltage at the +5-volt regulator in chassis location B01 per procedure CRT12. Adjust if necessary.

Procedure CRT16 — Replacing Display Terminal AC Entry Panel or Input Power Circuit Breaker

To remove ac power panel assembly, refer to figure CRT27 and perform the following:

1) Turn power off.

2) Pull ac plug from site power outlet.

3) Remove four screws which secure panel box to cabinet chassis.

4) Remove grounding wires connected to terminals E2, E3, and E4 on ac entry assembly.

5) Disconnect connector CP3 leading to the fan assembly.

6) Disconnect connector CP2 leading to the power supply.

7) Disconnect connector CP4 from capacitor board.

8) Withdraw entire ac power panel and its connectors from cabinet.

---

* No regulators are provided on the display/keyboard I/F module or in the case of the modem module with the CC617-B model, they may be provided but they are not used. The indicators light when +12 and -12-V dc is being received from the power supply regulator board.

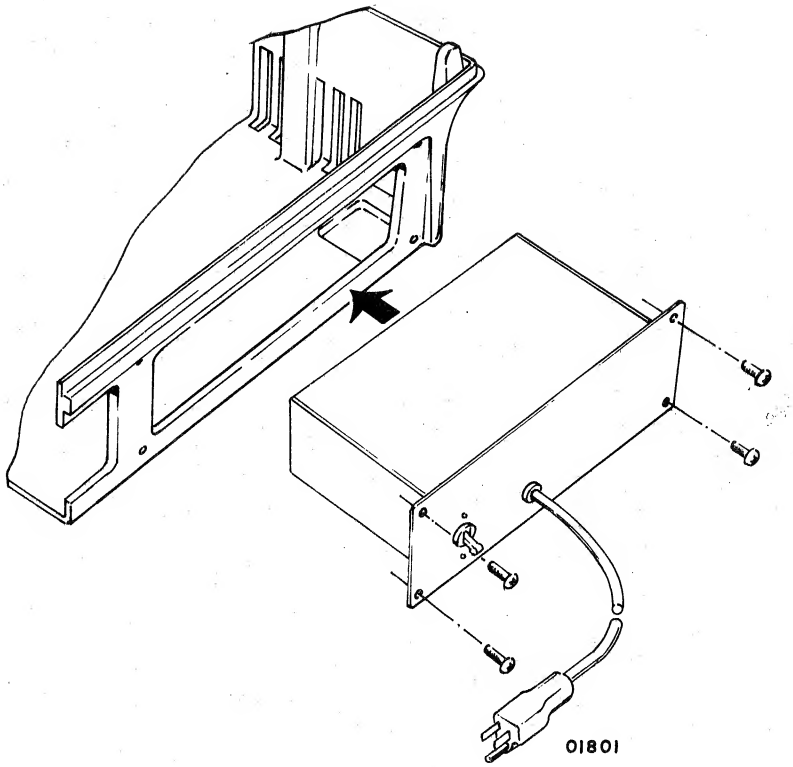


Figure CRT27. AC Entry Panel Removal

To replace the input power circuit breaker, do steps 9 through 13.

NOTE

Replacement of the circuit breaker requires that some soldering be done.

9) Remove two screws holding the ac entry panel cover.

10) Disconnect the three push-on connectors from the rear of CB1 at B, C, and D (figure CRT28).

11) Unsolder connection A at rear of CB1.

12) Remove the two screws mounting the circuit breaker to the panel.

13) Install a replacement circuit breaker (same part number as the one removed), by performing the preceding steps in reverse order.

To install ac entry panel, perform the following:

14) Feed connectors through chassis hole and insert ac power panel (box) into chassis compartment.

15) Attach grounding wires to E2, E3, and E4.

16) Connect cable connectors (CP3 goes to fan assembly, CP2 goes to power supply, CP4 goes to capacitor board).

17) Fasten four screws (figure CRT27).

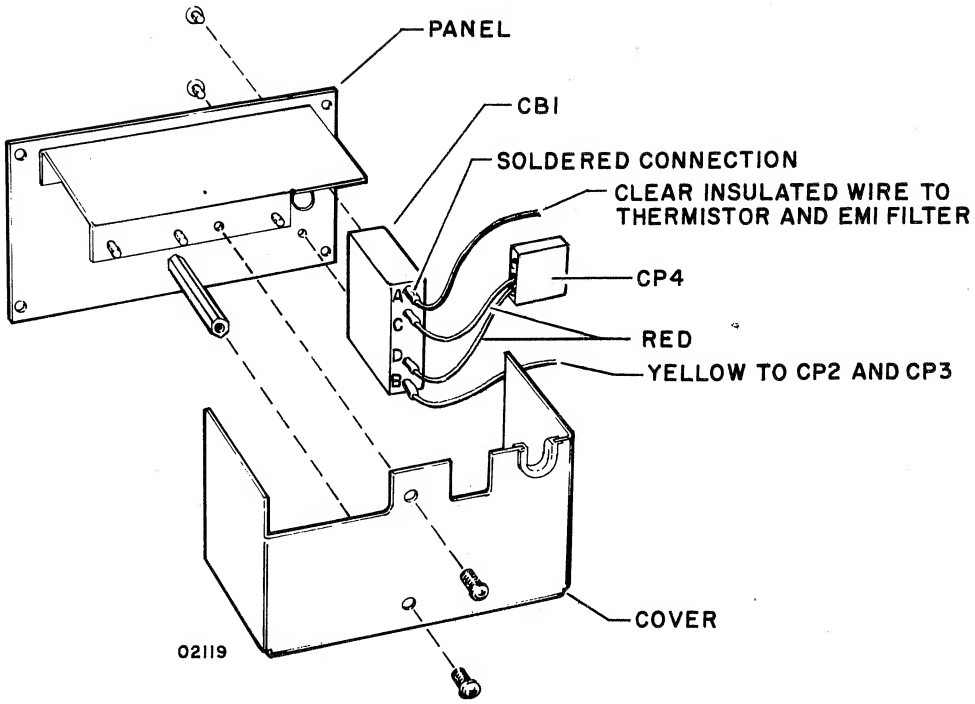


Figure CRT28. Circuit Breaker Connection

Procedure CRT17 — Replacing a Fan

To replace the fan, refer to figure CRT29 and perform the following steps:

1) Turn crt power off and disconnect ac power pord from site power outlet.

2) Remove four mounting screws from logic module card cage.

3) Lift card cage carefully upward and to rear sufficiently to gain access to connectors mounted on backplane of card cage. Tag connectors as required to ensure proper reconnection, disconnect cables, and remove card cage.

4) Disconnect connector CP3 from fan assembly to ac entry panel.

5) Remove mounting screws from fan assembly and lift free of cabinet.

6) Install a replacement fan assembly and reassemble unit per the reverse of the preceding steps.

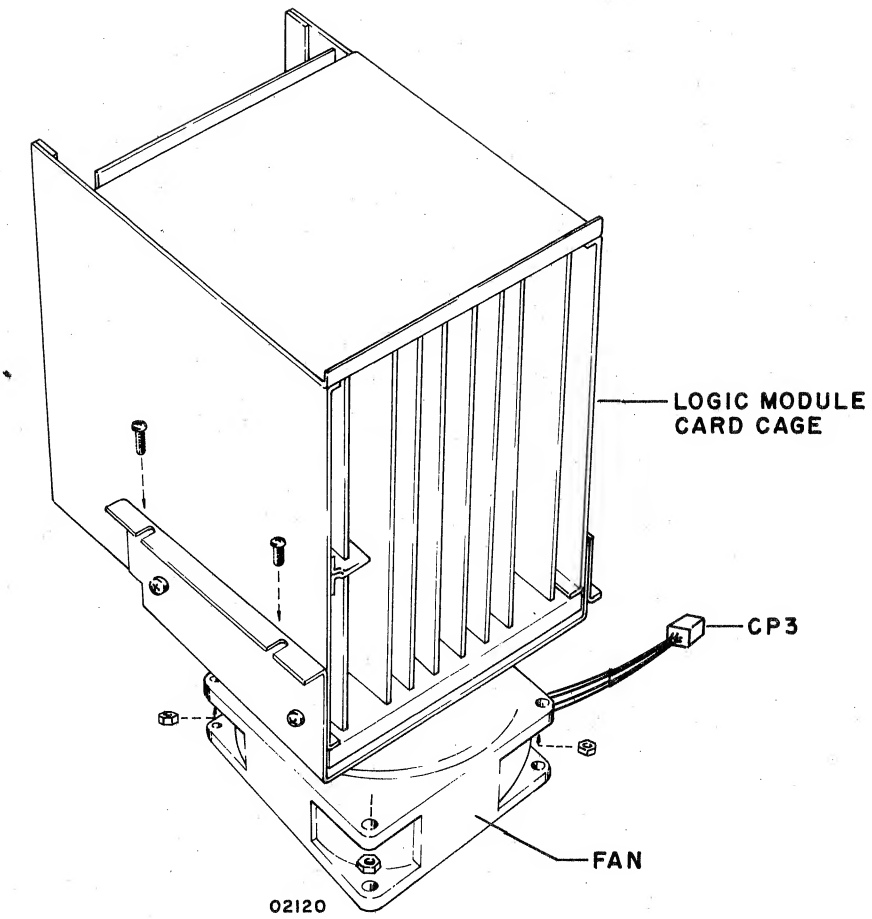


Figure CRT29. Logic Module Card Cage and Fan Removal

Procedure CRT18 — Replacing a Logic Card

To remove and replace a logic card, refer to figure CRT30 and perform the following steps:

1) Place the rear panel circuit breaker to the Down (off) position.

2) Remove two screws holding cabinet hood to chassis and remove cabinet hood.

3) Locate logic card to be removed and pull out simultaneously on both card ejectors. Slide logic card out of chassis.

4) Install logic card with component side facing right. If logic card contains switches, verify that the settings are correct. (Refer to section 3 for switch settings.) Seat the logic card in the connector by pressing on the card ejectors. If card contains voltage indicating LEDs as listed in table 6-1, verify that they are lit when power is applied.

5) If PC board being replaced is a +5-volt regulator, perform voltage adjustment procedure CRT12.

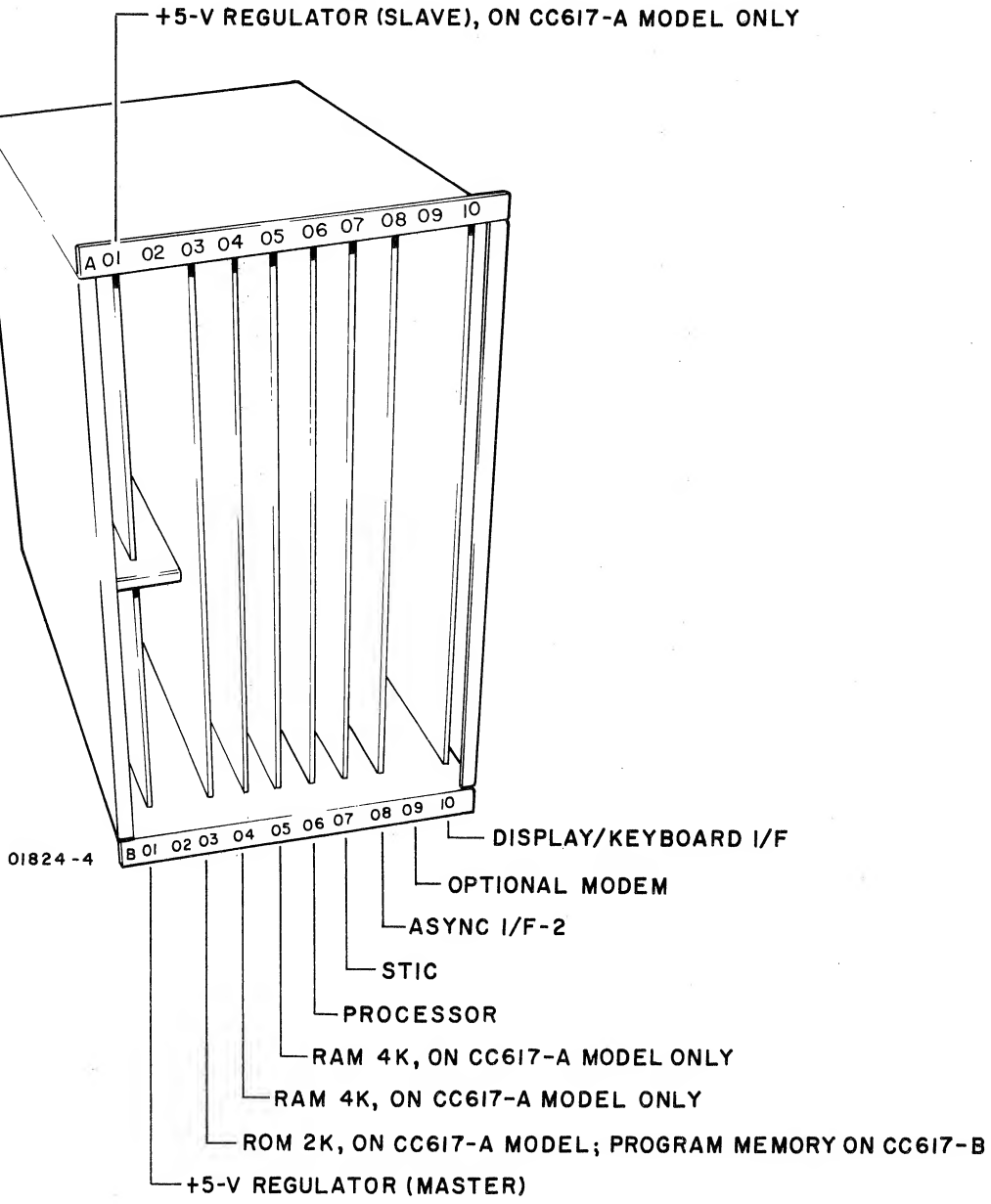
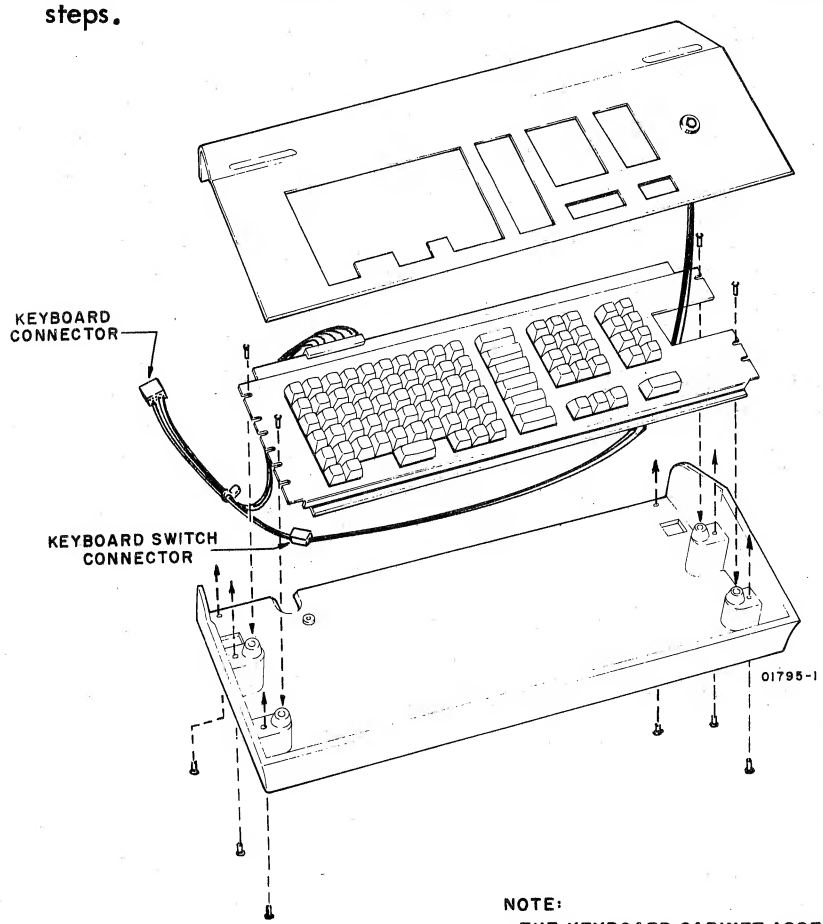


Figure CRT30. Logic Card Locations

Procedure CRT19 — Replacing Keyboard Assembly

Perform the following steps to replace a keyboard assembly. Refer to figure CRT31 and pay special attention to its note.

1) Turn display terminal power off. Place circuit breaker at the rear of the display in the Down (off) position.
2) Remove six screws from bottom of keyboard cabinet.
3) Open both halves of keyboard cabinet being careful not to damage connected cable inside.
4) Disconnect connector from keyboard assembly PC board and if existent, connector to the keylock switch.
5) Remove four screws mounting keyboard assembly to top half of keyboard cabinet.
6) Install a new keyboard assembly by performing the reverse of the preceding steps.



NOTE:
THE KEYBOARD CABINET ASSEMBLY SHOWN, IS REPRESENTATIVE OF A TYPICAL KEYBOARD MODULE USED IN AN APPLICATION OF THE DISPLAY TERMINAL. CERTAIN FEATURES SHOWN THEREFORE, MAY DIFFER WITH THE APPLICATION.

Figure CRT31. Keyboard Cabinet Assembly

Procedure CRT20 — Replacing Keyboard Keyswitches

Perform the following steps to replace the keyswitches of a keyboard. Refer to figure CRT31.

1) Remove the keyboard assembly from the keyboard cabinet per steps 1 through 5 of procedure CRT19.

2) To replace a keyswitch pry off the keycap and unsolder the faulty switch from the keyboard assembly PC board. Install a new keyswitch, soldering its pins to the PC board and press the keycap onto the switch.

3) Reinstall the keyboard assembly in the keyboard cabinet per the reverse of steps 1 through 5 of procedure CRT19.

Procedure CRT21 — Replacing Power Supply

To replace the power supply, perform the following steps:

1) Turn crt power off.

2) Disconnect ac power cord from site power outlet.

3) Remove video module (procedure CRT6, steps 1 through 6).

4) Disconnect connector AP2 from power supply to backplane.

5) Disconnect connectors CP2 and CP4 from ac entry panel to power supply.

6) Loosen ac entry panel screws (figure CRT27).

7) Remove four screws mounting power supply to cabinet frame.

8) Lift power supply free of cabinet and install a replacement power supply per the reverse of the preceeding steps.

Procedure CRT22 — Resonating Capacitor Replacement

To replace the ferro transformer resonating capacitor, perform the following steps:

1) Gain access to the power supply by removing the video module from the display terminal. Refer to procedure CRT6, steps 1 through 6.

NOTE

The vendor has increased the length of the resonating capacitor. This requires that all new capacitors be mounted horizontally instead of vertically.

2) For serial numbers 101 through 112 (preproduction units with capacitor mounted vertically), perform step a. For serial numbers 113 and up (production units with capacitor mounted horizontally), perform step b.

   a) Remove the resonating capacitor (part number 95686705), mounting clamp (part number 95656900), and associated screws, nuts and washers. Leave boot (part number 94780200) and wire leads attached to transformer.

   b) Remove the resonating capacitor (part number 95686705), from the two mounting clamps (part number 71491961). Leave boot and wire leads attached to transformer.

3) Install replacement capacitor horizontally using two mounting clamps (part number 71491961) and associated hardware per figure CRT32.

4) Connect wire leads along with boot to capacitor and reinstall shield to top of power supply.

5) Reinstall the video module in the display terminal. Refer to procedure CRT6, steps 7 through 15.

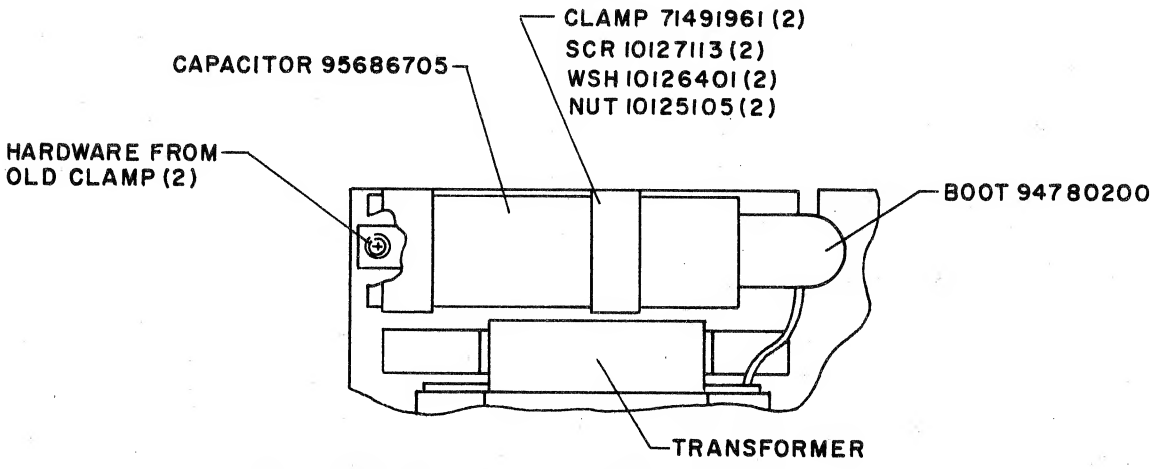


Figure CRT32. Resonating Capacitor Mounting

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INDEX

CRT DISPLAY/KEYBOARD

Figures

Tables

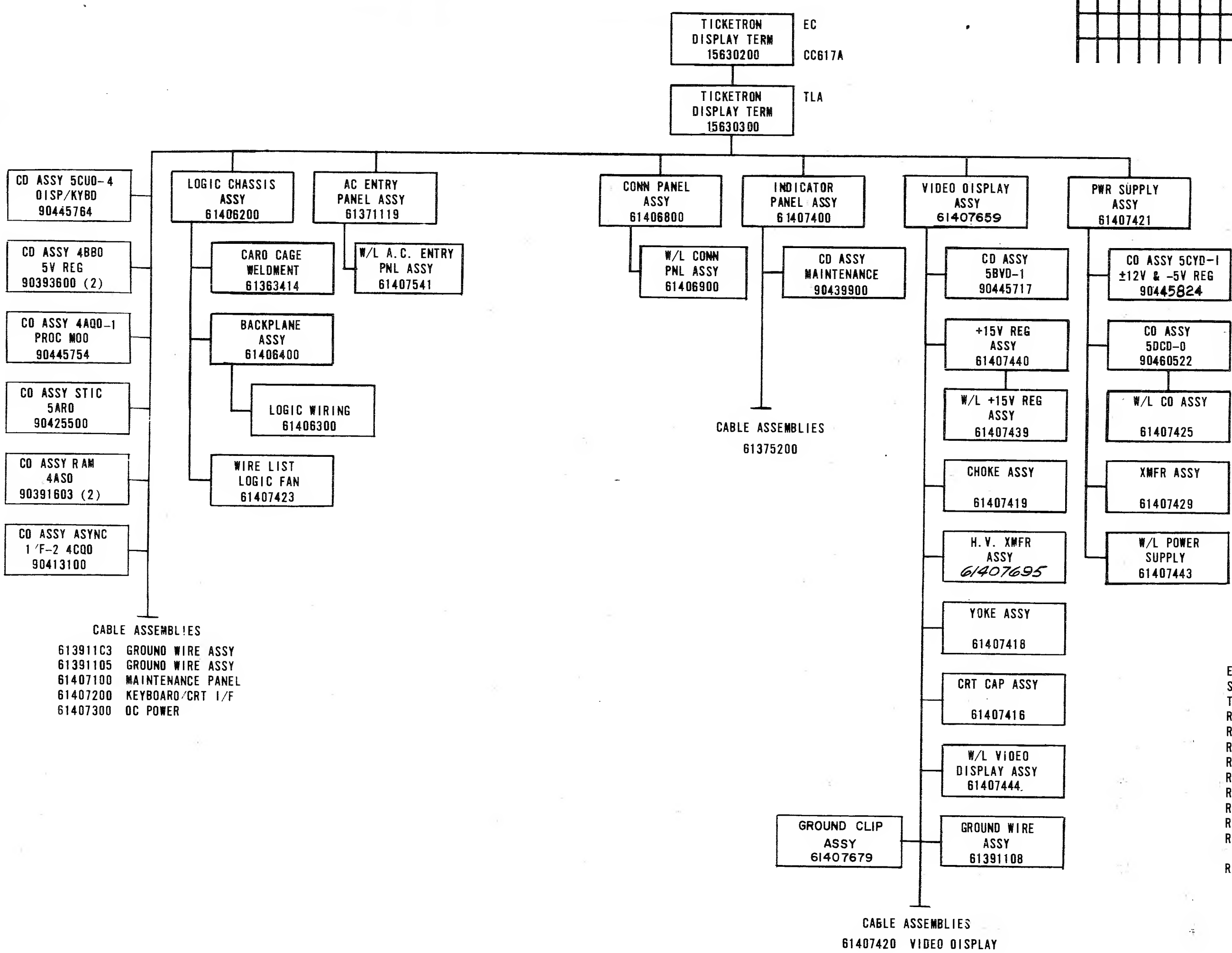
This section provides the parts data information necessary for on-site maintenance of the display terminal. In the case of the CC617-B model, this information will have to be supplemented by the parts data information contained in the keyboard module manual that was initially shipped with the equipment. That manual will provide the parts data necessary for replacement of keycaps, keyswitches, the keyboard itself, and other associated items such as the keyboard interconnection cable. Regarding replacement of the program memory module used in the application of CC617-B, the assembly part number is stamped on the module itself along the outer board edge. This part number represents the entire module including the firmware. If an internal modem module is used in the application of CC617-B, the assembly part number of that module also appears on the module itself.

The column headings of the assembly parts lists that appear in this section are defined in table 7-1.

TABLE 7-1. DEFINITION OF COLUMN HEADINGS ON ASSEMBLY PARTS LISTS

COLUMN HEADING	EXPLANATION
FIND NO.	Identifies an electrical or mechanical part on an assembly drawing. If more than one listing appears for a find number, refer to LI, WK IN, and WK OUT.
LI (Line Item)	Gives a chronological or historical record of the addition of a new part to a find number. For example, 01 indicates that the part was the first one used, and 02 indicates the second, etc. See also WK IN and WK OUT.
PART NUMBER	Gives the Control Data Corporation part identification. Use this number when ordering replacements.
CD (Check Digit)	Gives the information-control system a means of cross-checking the correctness of a part number.
QUANTITY	Lists the total number of a part required to complete an assembly. The vertical line near the center of the column acts as a decimal point. Numbers to the left of the line are whole numbers. Those to the right of the line are tenths, hundredths, and thousandths.
U/M (Unit of Measure)	Indicates how the information-control system counts or supplies a part.
PART DESCRIPTION	Describes the physical appearance, type, or name of a part.
MC (Material Control Code)	Supplies additional descriptive data to the information-control system.
YLD (Yield)	A 2-digit number that indicates the usable portion of any quantity of parts expressed as a percentage.
ECO NO. IN	Engineering Change Order that adds a new part to an assembly. See also WK IN.
ECO NO. OUT	Engineering Change Order that deletes a part from an assembly. See also WK OUT.
S/N (Serial Number)	Used to specify an ECO's effectivity by serial number.
WK IN (Week In)	Lists the date when manufacturing begins using a new part and when it is available for parts replacement. For example, 7222 means a part is available as of the 22nd week of 1972.
WK OUT (Week Out)	Lists the date when manufacturing no longer uses a part in building an assembly. See also WK IN. Do not order a part after its week-out date.

00643-1



SHEET REVISION STATUS

REVISION RECORD

REV	CO	DESCRIPTION	DRFT	DATE	CHKD	APP
		RELEASED CLASS		9/16/74		
01	C627	CHG P/N ON VIDEO DISPLAY CD ASSY 5BVD-1, +15V REG, AND W/L +15V REG.		7/3/76		
02	C657	VIDEO DISP WAS 61376900 ADDED W/L PWR SPLY		2/12/76		
A	10842-37	RELEASED CLASS A		3/16/76		
B	11470	REVISED PER ECO		6-14-76		
C	11617	REVISED PER ECO	M.T.	7-17-76		
D	11619	CD 5CUD-3 WAS 5CUD-2		9-23-76		
E	CD11687	REVISED PER ECO		11-4-76		
F	11780	REVISED PER ECO		11-16-76		
G	CD11642	REVISED PER ECO		1-18-77		
H	CD11897	ADDED GND CLIP ASSY		4-5-77	DW	
J	12115	REVISED PER ECO		5/13/77		
K	12010	REVISED PER ECO		6/7/77		
L	12424	REVISED PER ECO	MD	8/31/77		
M	12510	REVISED PER ECO	RJH	1-4-78		

REFERENCE DOCUMENTS

ENGINEERING SPECIFICATION	16042702
SPARE PARTS LIST	66298750
TICKETRON HARDWARE MAINTENANCE MANUAL	62953000
REPAIR CENTER MANUAL, PROCESSOR MODULE	62960000
REPAIR CENTER MANUAL, RAM MODULE	62960100
REPAIR CENTER MANUAL, STIC MODULE	62961100
REPAIR CENTER MANUAL, ASYNC I/F-2 MODULE	62960300
REPAIR CENTER MANUAL, DISPLAY/KYBD I/F MODULE	62969300
REPAIR CENTER MANUAL, MAINTENANCE PANEL	62960500
REPAIR CENTER MANUAL, +5 REGULATOR MODULE	62960700
REPAIR CENTER MANUAL, POWER SUPPLY	62969500
REPAIR CENTER MANUAL, VIDEO DISPLAY MODULE	62961800
REPAIR CENTER MANUAL, LOGIC CHASSIS	62960400

REFERENCE DRAWING

COMPONENTS, EXCEPT AS NOTED: TOLERANCE, VALUE, RATING; RES; CAP

CONTROL DATA

FIRST USED ON: CC617A

DWN	D.WELLS	1-14-76
CHKD		
ENGR		1/16/76
MFG	T. Foreman	2-13-76
APPR		2-13-76

TITLE: GENEALOGY CHART

CODE IDENT 15920 | C | DRAWING NO 66298605

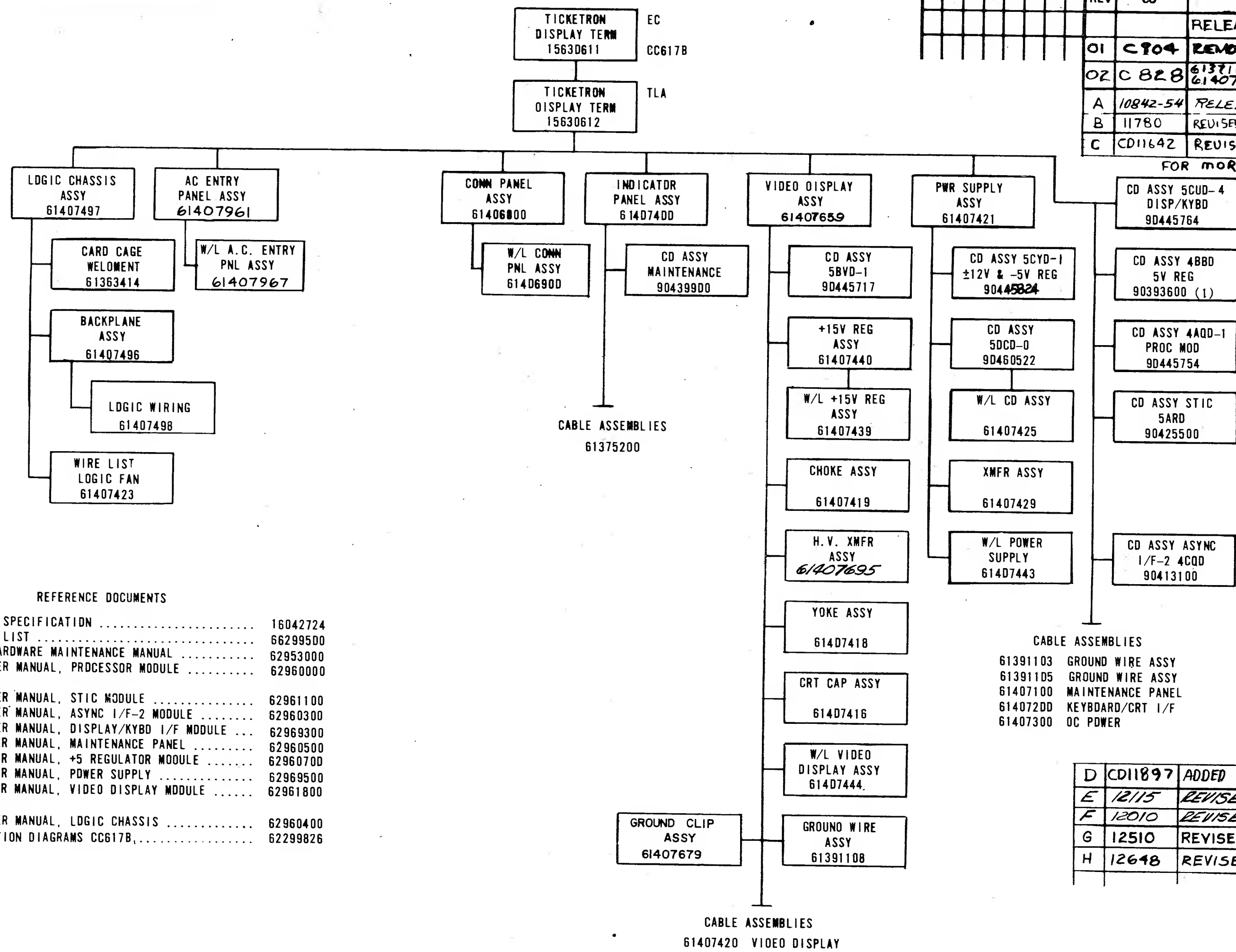
SCALE | CROSS REF NO | SHEET / OF /

SHEET REVISION STATUS

REVISION RECORD

REV	CO	DESCRIPTION	DRFT	DATE	CHKD	APP
		RELEASED CLASS C		7-9-76		JRH
01	C804	REMOVED KYBD	R	7/23/76	[illegible]	JRH
02	C828	61371119 WAS 61371117 61407541 WAS 61407435	MD	8-4-76	MP	JRH
A	10842-54	RELEASED CLASS A	—	8-18-76	—	R.T.
B	11780	REVISED PER ECO	[illegible]	11-16-76	MD	JRH
C	CD11642	REVISED PER ECO	[illegible]	1-20-77	DCW	GFO

FOR MORE REV SEE BELOW



REFERENCE DOCUMENTS

ENGINEERING SPECIFICATION 16042724
SPARE PARTS LIST 66299500
TICKETRON HARDWARE MAINTENANCE MANUAL 62953000
REPAIR CENTER MANUAL, PROCESSOR MODULE 62960000

REPAIR CENTER MANUAL, STIC MODULE 62961100
REPAIR CENTER MANUAL, ASYNC I/F-2 MODULE 62960300
REPAIR CENTER MANUAL, DISPLAY/KYBD I/F MODULE ... 62969300
REPAIR CENTER MANUAL, MAINTENANCE PANEL 62960500
REPAIR CENTER MANUAL, +5 REGULATOR MODULE 62960700
REPAIR CENTER MANUAL, POWER SUPPLY 62969500
REPAIR CENTER MANUAL, VIDEO DISPLAY MODULE 62961800

REPAIR CENTER MANUAL, LOGIC CHASSIS 62960400
INTERCONNECTION DIAGRAMS CC617B.................. 62299826

REV	CO	DESCRIPTION	DRFT	DATE	CHKD	APP
D	CD11897	ADDED GND CLIP ASSY	[illegible]	4/5/77	DW	JRH
E	12115	REVISED PER ECO	[illegible]	5/13/77	[illegible]	[illegible]
F	12010	REVISED PER ECO	[illegible]	6/7/77	[illegible]	[illegible]
G	12510	REVISED PER ECO	RJH	1-4-78	Jhm	[illegible]
H	12648	REVISED PER ECO	EE	2/21/78	EE	[illegible]

REFERENCE DRAWING			
COMPONENTS, EXCEPT AS NOTED	TOLERANCE	VALUE	RATING
RES			
CAP			

CONTROL DATA

FIRST USED ON	CC617B
DWN	D.WELLS 6-22-76
CHKD	[illegible] 7/8/76
ENGR	[illegible] 7/9/76
MFG	[illegible] 8-17-76
APPR	[illegible] 8-17-76

TITLE

GENEALOGY CHART

CODE IDENT 15920 | C | DRAWING NO 66299263

SCALE | CROSS REF NO | SHEET / OF /

66299263

HARDWARE PRODUCT CONFIGURATOR (HPC)

QSE

PRODUCT NO. 18339

MODEL NO.

SHEET REV STATUS

SHEET NUMBER

REVISION RECORD

REV.	ECO NO.	DESCRIPTION	DRFT.	DATE	CHKD.	APP.
		RELEASED CLASS C				LL
01	C603	F/N 2 WAS 15622800	K	1-22-76	K	LL
02	C666	ADDED F/N 3, 4 & 5 TO HPC " F/N 5 TO APL	K	2-24-76	K	LL
03	C668	DELETED F/N 4	K	2-26-76	K	LL
A	6570-88	RELEASED CLASS A		3/1/76		M.C.T.
B	12424	REVISED PER ECO	MD	8/31/77	K	

PRODUCT NAME

TICKETRON TERMINAL

PRODUCT DESCRIPTION

The Ticketron Terminal consists of a Programmable Terminal Controller with assocaited I/O interfaces and a 12-inch CRT Display enclosed in a common cabinet. It has a detachable keyboard. Features include a Micro Processor Module, Random Access Memory Modules, Video Controller, 2 Asynchronous RS-232-C Modem interfaces and a Maintenance Panel. The controller chassis has provisions for future implementation of an Internal Modem.

This terminal is used with the existing Ticketron Ticket Printer Controller and Ticket Printer.

HPC PARTS LIST

PART OR DOCUMENT NO. *	QTY REQ.	EQUIP. NO.	TITLE	PART OR DOCUMENT NO.	QTY. REQ.	EQUIP. NO.	TITLE
FIND 1	1	CC617-A	Ticketron Term.	FIND 3	1		Cable Data Set
FIND 2	1	XA175-A	Firmware Mod.	FIND 4	1	CA137-M	Keyboard
				FIND 5	1		Pkg Matl

NOTE:

~~1. RELEASE OF THIS DOCUMENT DOES NOT IMPLY RELEASE OF THE DOCUMENTS CONTAINED HEREIN.~~

* See detached parts list.

PL 66298757

DETACHED LIST

ORIG.	L. Langlie	1-13-7
PROG. MGT.		1-14-76
ENG.		2-25-76
MFG.		2/26/76
PROD. PRICING		
SCHED-ULING		

CONTROL DATA

TITLE

HARDWARE PRODUCT CONFIGURATOR

CODE IDENT 15920 | A | DWG NO. 66298757 | B

SHEET OF

AA 2576 REV. 1/75

BUILD ARC 440

ASSEMBLY PARTS LIST

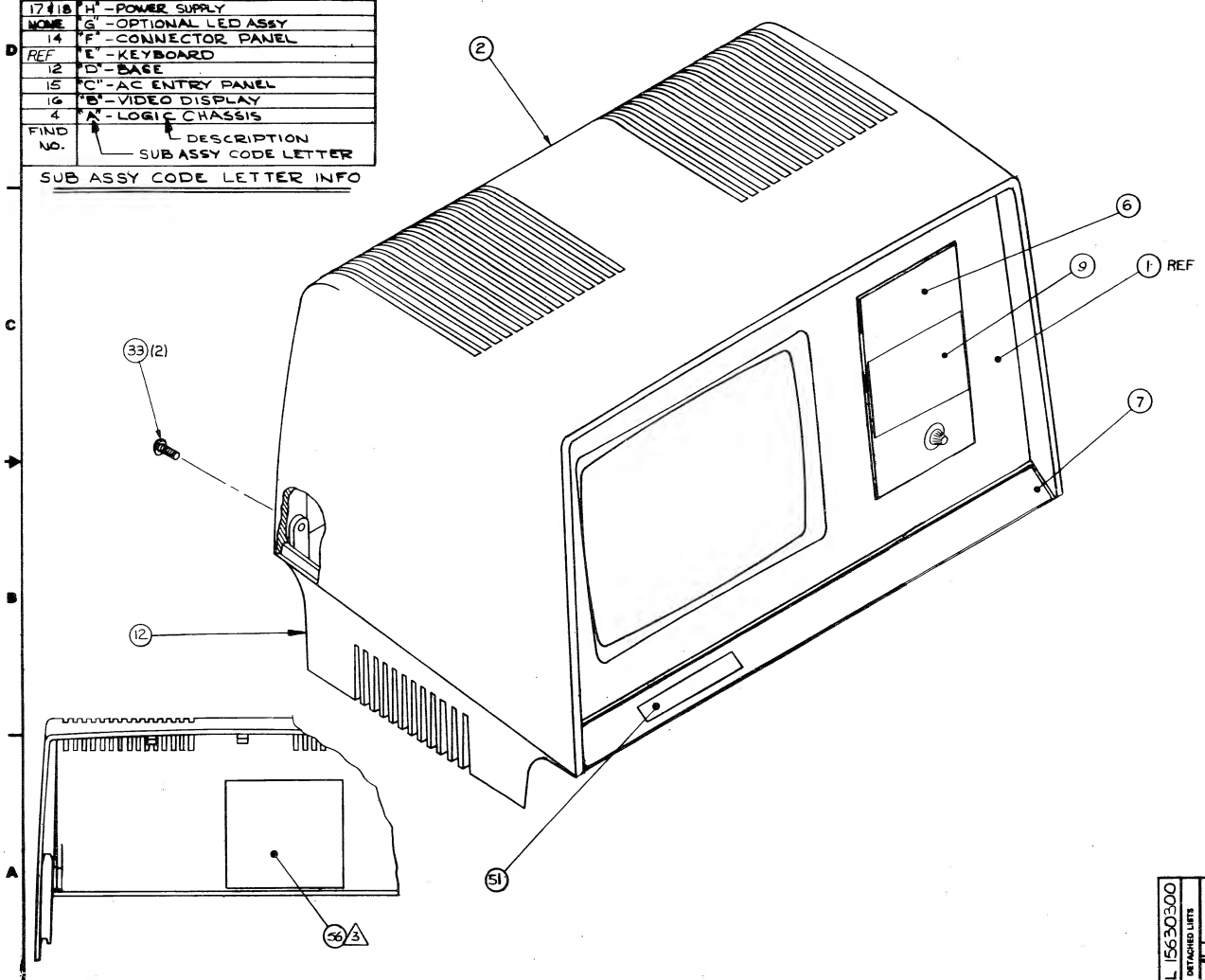
PRINT DATE	PAGE	FILE CHANGE NO.
08-16-77	1	00012424

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE
0860	66298757	7	B	A	HPC-QSE18330 TICKETRON TERM	T	REL	03-01-76	CC617A	08-16-77

T	FIND NO	LI	PART NUMBER	CD	M	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	001	01	15630200	2		1	PC	TERM, TKTRN DSPL 60HZ (EC)	N						
	002	01	15628800	3		1	PC	FIRMWARE, SMC 2KX8 EROM (EC)	N						
	003	01	61406100	0		2	PC	CABLE ASSY DATA SET 10FT 6IN	A						
	004	01	15630905	6		1	PC	KEYBOARD TICKETRON EC	N		12424			7734	
	005	01	41035800	6		1	PC	PKG DSPL AND KEYBOARD	P						
								0005 TOTAL LINES							

FIND NO.	DESCRIPTION / SUB ASSY CODE LETTER
6	"L" - INDICATOR PANEL
17 & 18	"H" - POWER SUPPLY
NONE	"G" - OPTIONAL LED ASSY
14	"F" - CONNECTOR PANEL
REF	"E" - KEYBOARD
12	"D" - BASE
15	"C" - AC ENTRY PANEL
16	"B" - VIDEO DISPLAY
4	"A" - LOGIC CHASSIS

SUB ASSY CODE LETTER INFO



INSIDE VIEW OF HOOD

SHEET REVISION STATUS	REV	ECO	DESCRIPTION	SHIFT	DATE	CHKD	APP
	03	C658	REPLACE A SIZE AND REVISE				
AA	A	10842-37	RELEASED CLASS A				
BB	B	11470	SHEET 2 - ADD STUD				
CC	C	11563	REMOVE F/N 58				
CD	D	11617	APL CHG ONLY	MT			
CE	E	11619	PL CHG ONLY				
FF	F	11620	ADD NOTE 6				
FG	G	11649	PL CHG ONLY				
FH	H	CD11687	PL CHG ONLY				
FJ	J	11780	PL CHG ONLY				
FK	K	CD11642	PL CHG ONLY				
FL	L	11723	F/N 7 WAS 7491968, ADDED F/N 9 7491300				
MM	M	CD11897	REVISED PER ECO				JRH
NN	N	12010	REVISED PER ECO				
PP	P	12424	REVISED PER ECO	MD			

NOTES:

1. MARK "TOP ASSY 15630300" IN AREA SHOWN PER CDC SPEC 10121508.
2. APPLY SERIAL NO. IN THIS AREA PER CDC STD 1.01.025.
3. BRUSH OFF EXCESS PAINT OVER SPRAY AND SOLVENT CLEAN BEFORE APPLYING.
4. SEE ENGRG SPEC 16036800, COLOR CODE KEYING SPECIFICATION.
5. ATTACH FIND NO. 5 (COPPER FOIL) TO FIND NO. 12 APPROXIMATELY AS SHOWN. DRIVE SCREWS THRU FOIL THEN TIGHTEN.
6. IF RIGHT LOWER HALF OF RASTER EXCEED GEOMETRIC TOLERANCE ATTACH MAGNETS, F/N 63 THRU 66, PER ENG. SPEC 16042735.
7. IF FOCUSING OF RASTER CORNERS IS REQUIRED, SEE ENG. SPEC 16042747.

APL 15630300 DETACHED LISTS

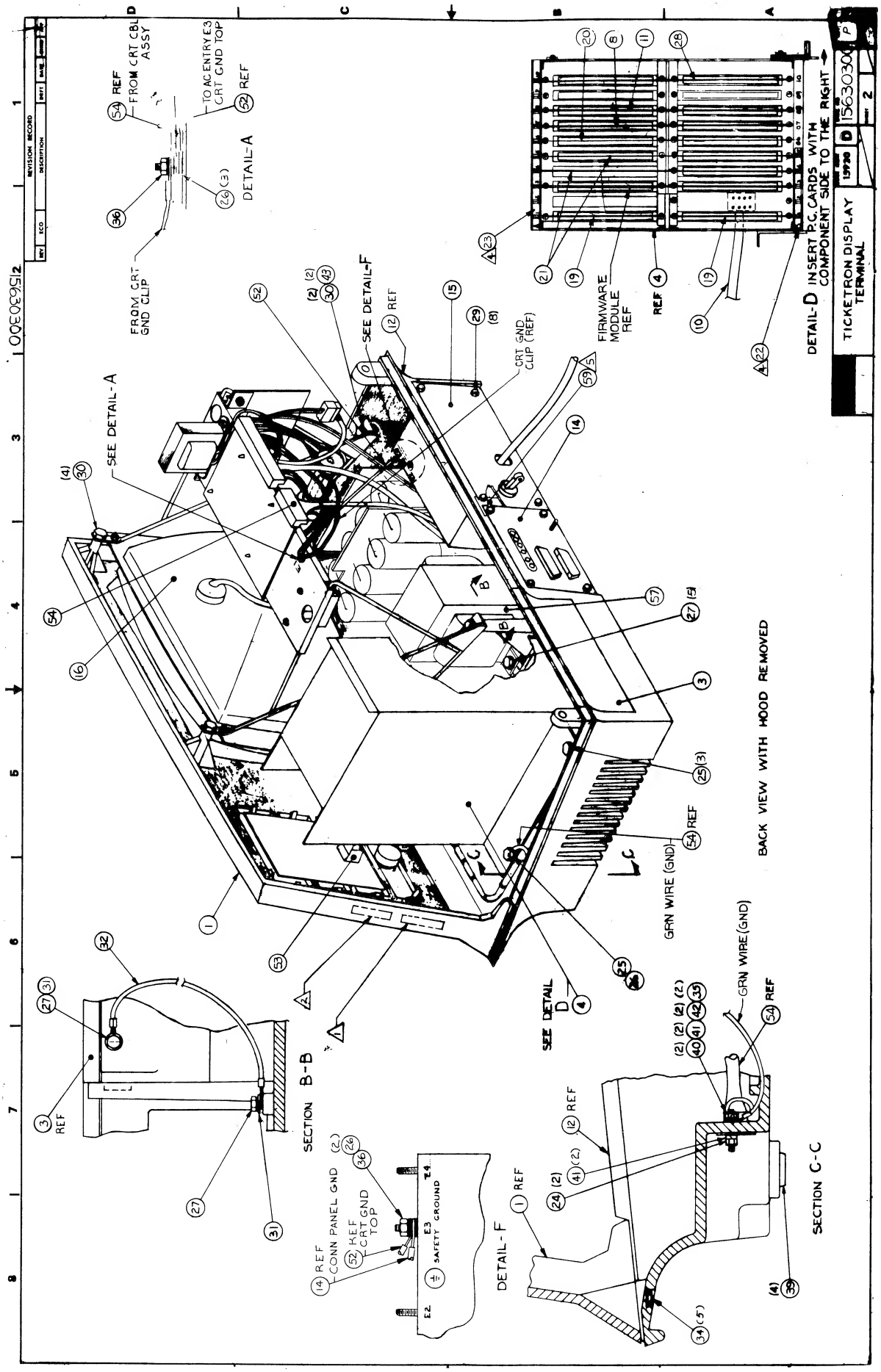
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES: 3 PLACE ±, 2 PLACE ±, ANGLES ±. DO NOT SCALE DRAWING. MATERIAL. FINISH.

NEXT USED ON	CC617 A	
DRAWN BY	D. WELLS	2-12-76
CHECKED BY		
ENGINEER		
MFG		2-13-76
APPROVED		2-10-76

TITLE: TICKETRON DISPLAY TERMINAL

CODE IDENT 15920 | SIZE D | DRAWING NO 15630300

SCALE | NHA 15630300 | SHEET 1 OF 2


TICKETRON DISPLAY TERMINAL
DETAIL-D INSERT P.C. CARDS WITH COMPONENT SIDE TO THE RIGHT
BACK VIEW WITH HOOD REMOVED
SECTION B-B
SECTION C-C
DETAIL-A
DETAIL-F
SEE DETAIL-A
SEE DETAIL-F
SEE DETAIL D
FROM CRT GND CLIP
TO AC ENTRY E3 CRT GND TOP
FROM CRT CBL ASSY
FIRMWARE MODULE REF
CRT GND CLIP (REF)
GRN WIRE (GND)
CONN PANEL GND
CRT GND TOP
E3 SAFETY GROUND
E2
T4

BUILD ARC 440

ASSEMBLY PARTS LIST

PRINT DATE 08-16-77 | PAGE 1 | FILE CHANGE NO. 00012424

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE
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T	FIND NO	LI	PART NUMBER	CD	M	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	001	01	71491851	3		1	PC	BEZEL CRT 12 INCH MOD	A						
	002	02	71491938	8		1	PC	HOOD, TERMINAL ≥SHIELDED↑	P		11470			7618	
	003	02	71491939	6		1	PC	PANEL, BASE ≥SHIELDED↑	P		11470			7618	
	004	01	61406200	8		1	PC	LOGIC CHASSIS ASSY	A						
	006	01	61407400	3		1	PC	INDICATOR PANEL ASSY	A						
	007	02	71491968	5		1	PC	PANEL, SWITCH (SHIELDED)	V		11470	11649		7618	7641
	007	03	71491969	3		1	PC	PANEL, SWITCH (SHIELDED/PTD)	V		11649	11773		7641	7719
	007	04	71491845	5		1	PC	PANEL BLANK, SWITCH ,PLASTIC)	P		11773			7719	
	008	01	90425500	7		1	PC	CD ASSY 5ARD-0(STIC)	A						
	009	01	71491300	1		1	PC	COVER PANEL INDICATOR	P		11773			7719	
	010	01	61407300	5		1	PC	CABLE ASSY DC POWER	A						
	011	01	90413100	0		1	PC	CD ASSY 4CQD (ASYNC I/F-2)	A						
	012	03	71491974	3		1	PC	BASE, TERMINAL ≥SHIELDED↑	P		11470A			7620	
	013	01	10127122	9		1	PC	MSCH PAN PHL 8-32X 3/8	B			12010			7717
	014	01	61406800	5		1	PC	CONNECTOR PANEL ASSY	A						
	015	01	61371117	5		1	PC	REPLACED BY 61371119 11687	A			11687			7642
	015	02	61371119	1		1	PC	PANEL ASSY (AC ENTRY) 60 HZ	A		11687			7642	
	016	01	61407438	3		1	PC	REPLACED BY 61407658 11897	G			11897			7708
	016	02	61407658	6		1	PC	VIDEO DISPLAY ASSY	G		11897	12010		7708	7717
	016	03	61407659	4		1	PC	VIDEO DISPLAY ASSY	G		12010			7717	
	019	01	90393600	3		2	PC	CD ASSY 4BRD +5V 10AMP	A						
	020	01	90391000	4		1	PC	REPLACED BY 90445754 11642	A			11642			7646
	020	02	90445754	6		1	PC	CD ASSY 4AQD-1 (PROC MOD)	A		11642			7646	
	021	01	90391603	9		2	PC	CD ASSY 4ASD(D) 4KX9 RAM MOD	A						

BUILD ARC 440

ASSEMBLY PARTS LIST

PRINT DATE 08-16-77 | PAGE 2 | FILE CHANGE NO. 00012424

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE
0860	15630300	0	P	U	TERM, TKTRN DSPL 60HZ (TA)	N	REL	02-16-76	CC617A	08-16-77

T	FIND NO	LI	PART NUMBER	CD	M	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	022	01	71474105	5		1	PC	LABEL B, CC CHAS 3.4IN VINYL	P						
	023	01	71474107	1		1	PC	LABEL A, CC CHAS 6.4IN VINYL	P						
	024	01	71455801	2		2	PC	STANDOFF MALE/FEMALE 4-40 STL	P						
	025	02	51858501	3		9	PC	SCREW 10X1/2 TYPE A HEX HD	B		114708	12010		7618	7717
	025	03	51858501	3		4	PC	SCREW 10X1/2 TYPE A HEX HD	B		12010			7717	
	026	01	10126403	4		7	PC	WSHR NO.10 EXT TOOTH LK TYP A	B			11897			7708
	026	02	10126403	4		8	PC	WSHR NO.10 EXT TOOTH LK TYP A	B		11897	12010		7708	7717
	026	03	10126403	4		6	PC	WSHR NO.10 EXT TOOTH LK TYP A	B		12010			7717	
	027	02	51858529	4		2	PC	SCREW SELF TAPPING	B		114708	12010		7618	7717
	027	03	51858529	4		7	PC	SCREW SELF TAPPING	B		12010			7717	
	028	04	90445751	2		1	PC	REPLACED BY 90445764 11780	A		11619	11780		7636	7646
	028	05	90445764	5		1	PC	CARD ASSY 5CUD-4	A		11780			7646	
	029	01	00860303	7		8	PC	MSCH SLF-LKG HEX 6-32X3/8	B						
	030	01	00860310	2		6	PC	MSCH SLF-LKG HEX 8-32X5/16	B			12010			7717
	030	02	00860311	0		6	PC	MSCH SLF-LKG HEX 8-32X3/8	B		12010			7717	
	031	01	10125606	3		2	PC	WASHER FLT NO.8 STL CP	B						
	032	01	61391105	6		1	PC	GND WIRE ASSY 7.5 16GA	A						
	033	01	10127153	4		2	PC	MSCH PAN PHL 1/4-20X 1/2	B						
	034	01	51858503	9		5	PC	SCREW 3/4L SZ 10 HEX	B						
	035	01	95125301	2		AR	OZ	LOC TITE SEALANT RED	B			11774			7732
	035	02	95125301	2		010	OZ	LOC TITE SEALANT RED	B		11774			7732	
	036	01	10125108	0		2	PC	NUT HEX MCH 10-32 STL CP OR Z	B						
	037	02	10127121	1		1	PC	MSCH PAN PHL 8-32X .312	B		11563	12010		7624	7717
	039	01	51805801	1		4	PC	BUMPER, RUBRER .300H SLF-STKG	B						

BUILD ARC 440

ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
08-16-77	3	00012424

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE
0860	15630300	0	P	0	TERM, TKTRN DSPL 60HZ (TA)	N	REL	02-16-76	CC617A	08-16-77

T	FIND NO	LI	PART NUMBER	CD	M	QUANTITY		U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	040	01	10125603	0		2		PC	WASHER FLT NO.4 STL CP	B						
	041	01	10126400	0		4		PC	WSHR NO.4 EXT TOOTH LK TYP A	B						
	042	01	10125103	1		2		PC	NUT HEX MCH 4-40 STL CP OR ZP	B						
	043	02	10126402	6		9		PC	WSHR NO.8 EXT TOOTH LK TYP A	B		11563	12010		7624	7717
	043	03	10126402	6		2		PC	WSHR NO.8 EXT TOOTH LK TYP A	B		12010			7717	
	051	01	15010307	5		1		PC	ID EMBLEM, PRODUCT MEDIUM AL	P						
	052	01	61391103	1		1		PC	GROUND WIRE ASSY 14 INCH	A						
	053	01	61407100	9		1		PC	CABLE ASSY MAINT PNL	A						
	054	01	61407200	7		1		PC	CABLE ASSY KYBD CRT I/F	A						
	056	01	71491818	2		1		PC	LABEL CARD LOCATION PAPER	P						
	057	01	61407421	9		1		PC	POWER SUPPLY ASSY	A						
	059	02	95558018	8			050	PC	TAPE, COPPER FOIL W 1.00	B		11620			7634	
	060	01	66298750	2		REF		PC	SPL DISPLAY TERM TICKETRON	D						
	061	01	66298605	8		REF		PC	GENEALOGY TICKETRON DISPLAY	D						
	062	01	51006067	6			050	OZ	ADHESIVE, SILIC	B		11620	12010		7634	7717
	062	02	51004063	7			050	PC	ADHESIVE, AMBER SYN ELASTOMER	B		12010			7717	
	063	01	51917050	0			500	PC	MAGNET BAR	P		11620	12010		7634	7717
	063	02	51917054	2		1		PC	MAGNET BAR	P		12010			7717	
	064	01	51917051	8			500	PC	MAGNET BAR	P		11620	12010		7634	7717
	064	02	51917051	8		1		PC	MAGNET BAR	P		12010			7717	
	065	01	51917052	6			500	PC	MAGNET BAR	P		11620	12010		7634	7717
	065	02	51917052	6		1		PC	MAGNET BAR	P		12010			7717	
	066	01	51917053	4			500	PC	MAGNET BAR	P		11620	12010		7634	7717

BUILD ARC 440

ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
08-16-77	4	00012424

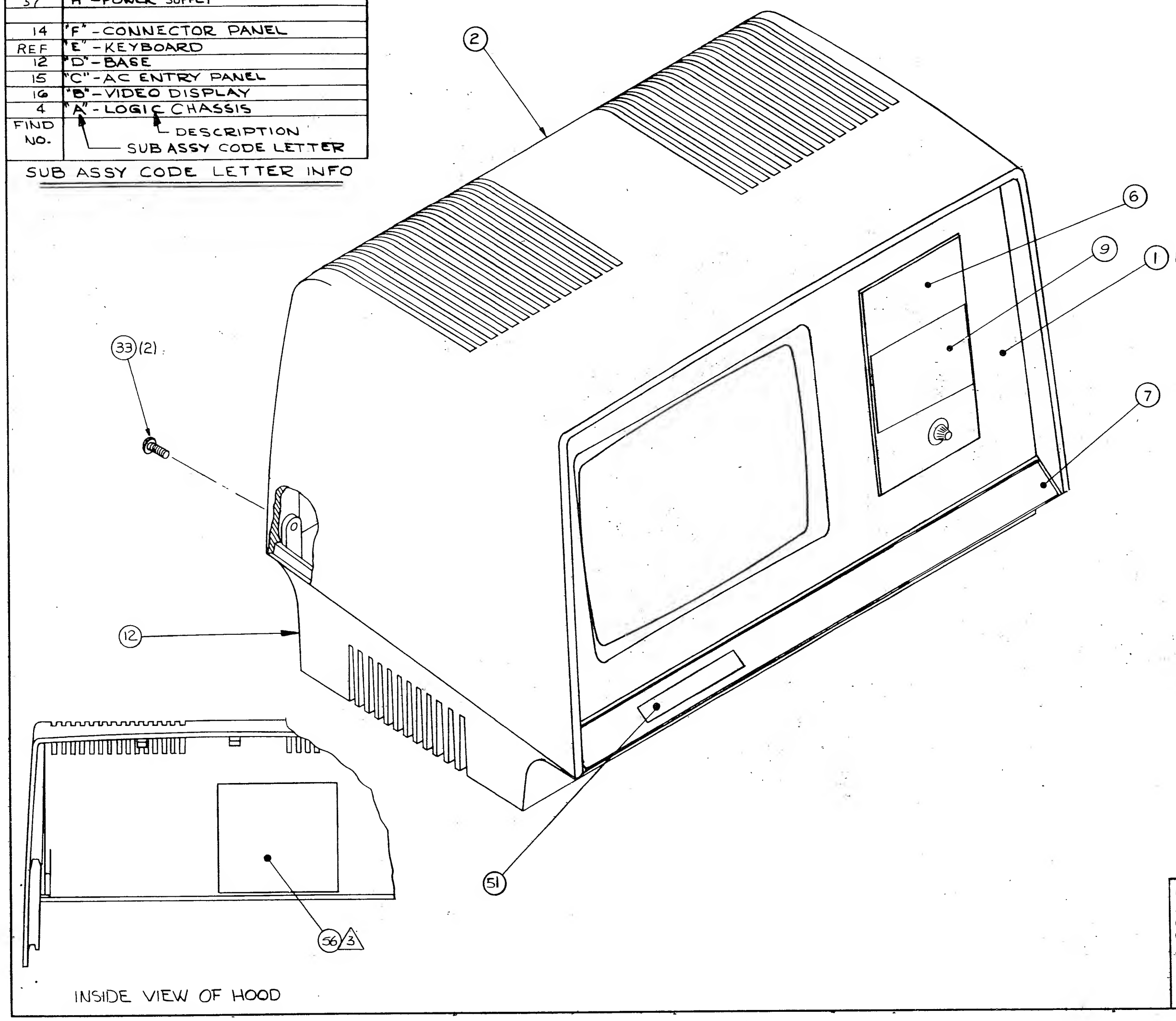
DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE
0860	15630300	0	P	0	TERM, TKTRN DSPL 60HZ (TA)	N	REL	02-16-76	CC617A	08-16-77

T	FIND NO	LI	PART NUMBER	CD	M	QUANTITY		U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	066	02	51917053	4		1		PC	MAGNET BAR	P		12010			7717	
	067	01	51917054	2			500	PC	MAGNET BAR	P		11620	12010		7634	7717
	067	02	16042739	9		REF		PC	GEOM DIST CORRECTION	D		12010			7717	
	068	01	51917055	9			500	PC	MAGNET BAR	P		11620	12010		7634	7717
	068	02	16042747	2		REF		PC	RING MAGNET ADJUSTMENT SPEC	D		12010			7717	

0076 TOTAL LINES

FIND NO.	SUB ASSY CODE LETTER / DESCRIPTION
6	"G" - INDICATOR PANEL
57	"H" - POWER SUPPLY
14	"F" - CONNECTOR PANEL
REF	"E" - KEYBOARD
12	"D" - BASE
15	"C" - AC ENTRY PANEL
16	"B" - VIDEO DISPLAY
4	"A" - LOGIC CHASSIS

SUB ASSY CODE LETTER INFO

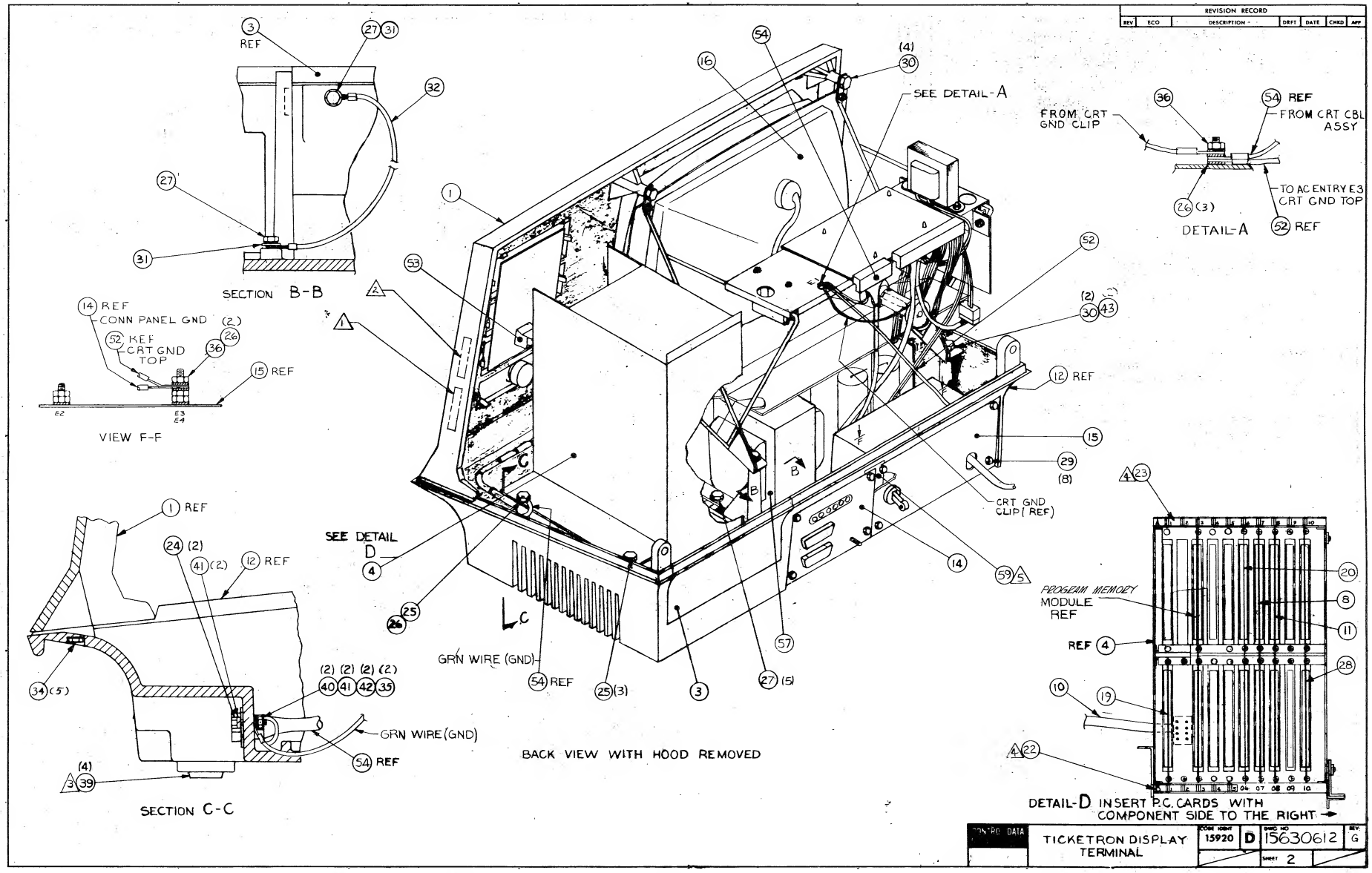


SHEET REVISION STATUS 2	1	REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP
				RELEASED CLASS C		7-9-76		JRH
01	01	01	C804	REMOVED KEYBOARD		7-13-76		JRH
01	02	02	C828	PL CHANGE ONLY		8-4-76	MP	
01	03	03	C829	PL CHANGE ONLY		8-11-76	MP	
A	A	A	10842 54	RELEASED CLASS A	—		—	
A	B	B	11780	PL CHG ONLY		11-12-76		
A	C	C	CD11142	PL CHG ONLY				
A	D	D	11773	F/N 7 WAS 71491969 ADD F/N 8 71491300		2/21/77		
E	E	E	CD11897	REVISED PER ECO		4/5/77		
F	F	F	12010	REVISED PER ECO				
G	G	G	12648	REVISED PER ECO	EE	2/24/78	EE	

NOTES:

1. MARK "TOP ASSY 15630612" IN AREA SHOWN PER CDC SPEC 10121508.
2. APPLY SERIAL NO. IN THIS AREA PER CDC STD 1.01.025.
3. BRUSH OFF EXCESS PAINT OVER SPRAY AND SOLVENT CLEAN BEFORE APPLYING.
4. SEE ENGRG SPEC 16036800, COLOR CODE KEYING SPECIFICATION.
5. ATTACH FIND NO.59 (COPPER FOIL) TO FIND NO. 12 APPROXIMATELY AS SHOWN. DRIVE SCREWS THRU FOIL, THEN TIGHTEN.
6. IF RIGHT LOWER HALF OF RASTER EXCEEDS GEOMETRIC TOLERANCE, ATTACH MAGNETS - F/N 63 THRU - PER ENG. SPEC 16042739.
7. IF FOCUSING OF RASTER CORNERS IS REQUIRED, SEE ENG. SPEC 16042747.

APL 15630612	DETACHED LISTS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	TOLERANCES 3 PLACE ± / 2 PLACE ± / ANGLES ±
DO NOT SCALE DRAWING	MATERIAL / FINISH
CONTROL DATA	
FIRST USED ON	CC617B
DRAWN BY	D.WELLS 6-22-76
CHECKED BY	7/8/76
ENGINEER	7/9/76
MFG	8-12-76
APPROVED	8-17-76
TITLE	TICKETRON DISPLAY TERMINAL
CODE IDENT	15920
SIZE	D
DRAWING NO	15630612
SCALE	NHA 15630611
SHEET	1 OF 2


REVISION RECORD
REV | ECO | DESCRIPTION | DRFT | DATE | CHKD | APP
SECTION B-B
VIEW F-F
SECTION C-C
BACK VIEW WITH HOOD REMOVED
SEE DETAIL-A
DETAIL-A
FROM CRT GND CLIP
FROM CRT CBL ASSY
TO AC ENTRY E3 CRT GND TOP
CRT GND CLIP (REF)
SEE DETAIL D
GRN WIRE (GND)
PROGRAM MEMORY MODULE REF
DETAIL-D INSERT P.C. CARDS WITH COMPONENT SIDE TO THE RIGHT
CONTROL DATA
TICKETRON DISPLAY TERMINAL
CODE IDENT 13920
D
DWG NO 15630612
REV G
SHEET 2

BUILD ARC 440

ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
12-15-77	1	00012648

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE
0860	15630612	8	G	U	TERM, TKTRN DSPL 60HZ (TA)	N	REL	08-18-76	LCO178	12-15-77

T	FIND NO	LI	PART NUMBER	CD	M	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	001	01	71491851	3		1	PC	BEZEL CRT 12 INCH MOD	A						
	002	01	71491938	8		1	PC	HOOD, TERMINAL ≥SHIELDED◆	P						
	003	01	71491939	6		1	PC	PANEL, BASE ≥SHIELDED◆	P						
	004	01	61407497	9		1	PC	LOGIC CHASSIS ASSY	A						
	006	01	61407400	3		1	PC	INDICATOR PANEL ASSY	A						
	007	02	71491845	5		1	PC	PANEL BLANK, SWITCH ,PLASTIC)	P		11773			7719	
	008	01	90425500	7		1	PC	CD ASSY 5AHD=0(STIC)	S						
	009	01	71491300	1		1	PC	COVER PANEL INDICATOR	P		11773			7719	
	010	01	61407300	5		1	PC	CABLE ASSY DC POWER	A						
	011	01	90413100	0		1	PC	CD ASSY 4CQD (ASYNC I/F=2)	S						
	012	01	71491974	3		1	PC	BASE, TERMINAL ≥SHIELDED◆	P						
	014	01	61406800	5		1	PC	CONNECTOR PANEL ASSY	A						
	015	01	61371119	1		1	PC	PANEL ASSY (AC ENTRY) 60 HZ	A			12648			7820
	015	02	61407961	4		1	PC	PANEL ASSY (AC ENTRY)	A		12648			7820	
	016	03	61407659	4		1	PC	VIDEO DISPLAY ASSY	G		12010			7717	
	019	01	90393600	3		1	PC	CD ASSY 4BBD ◆5V 10AMP	S						
	020	02	90445754	6		1	PC	CD ASSY 4AQD=1 (PROC MOD)	S		11642			7646	
	022	01	71474105	5		1	PC	LABEL B, CC CHAS 3.4IN VINYL	P						
	023	01	71474107	1		1	PC	LABEL A, CC CHAS 6.4IN VINYL	P						
	024	01	71455801	2		2	PC	STANDOFF MALE/FEMALE 4-40 STL	P						
	025	02	51858501	3		4	PC	SCREW 10X1/2 TYPE A HEX HD	B		12010			7717	

BUILD ARC 440

ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
12-15-77	2	00012648

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE
0860	15630612	8	G	U	TERM, TKTRN DSPL 60HZ (TA)	N	REL	08-18-76	LCO178	12-15-77

T	FIND NO	LI	PART NUMBER	CD	M	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	026	03	10126403	4		6	PC	WSHR NO.10 EXT TOOTH LK TYP A	B		12010			7717	
	027	02	51858529	4		7	PC	SCREW SELF TAPPING	B		12010			7717	
	028	02	90445764	5		1	PC	CARD ASSY 5CUD=4	S		11780			7646	
	029	01	00860303	7		8	PC	MSCR SLF-LKG HEX 6-32X3/8	B						
	030	02	00860311	0		6	PC	MSCR SLF-LKG HEX 8-32X3/8	B		12010			7717	
	031	01	10125606	3		2	PC	WASHER FLT NO.8 STL CP	B						
	032	01	61391105	6		1	PC	GND WIRE ASSY 7.5 16GA	A						
	033	01	10127153	4		2	PC	MSCR PAN PHL 1/4-20X 1/2	B						
	034	01	51858503	9		5	PC	SCREW 3/4L SZ 10 HEX	B						
	035	02	95125301	2		.010	OZ	LOC TITE SEALANT RED	B		11774			7723	
	036	01	10125108	0		2	PC	NUT HEX MCH 10-32 STL CP OR ZP	B						
	039	01	51805801	1		4	PC	BUMPER, RUBBER .300H SLF-STKG	B						
	040	01	10125603	0		2	PC	WASHER FLT NO.4 STL CP	B						
	041	01	10126400	0		4	PC	WSHR NO.4 EXT TOOTH LK TYP A	B						
	042	01	10125103	1		2	PC	NUT HEX MCH 4-40 STL CP OR ZP	B						
	043	02	10126402	6		2	PC	WSHR NO.8 EXT TOOTH LK TYP A	B		12010			7717	
	051	01	15010307	5		1	PC	ID EMBLEM, PRODUCT MEDIUM -L	P						
	052	01	61391103	1		1	PC	GROUND WIRE ASSY 14 INCH	A						
	053	01	61407100	9		1	PC	CABLE ASSY MAINT PNL	A						
	054	01	61407200	7		1	PC	CABLE ASSY KYBD CRT I/F	A						
	056	01	71492004	8		1	PC	LABEL, CARD LOCATION (VINYL)	P						

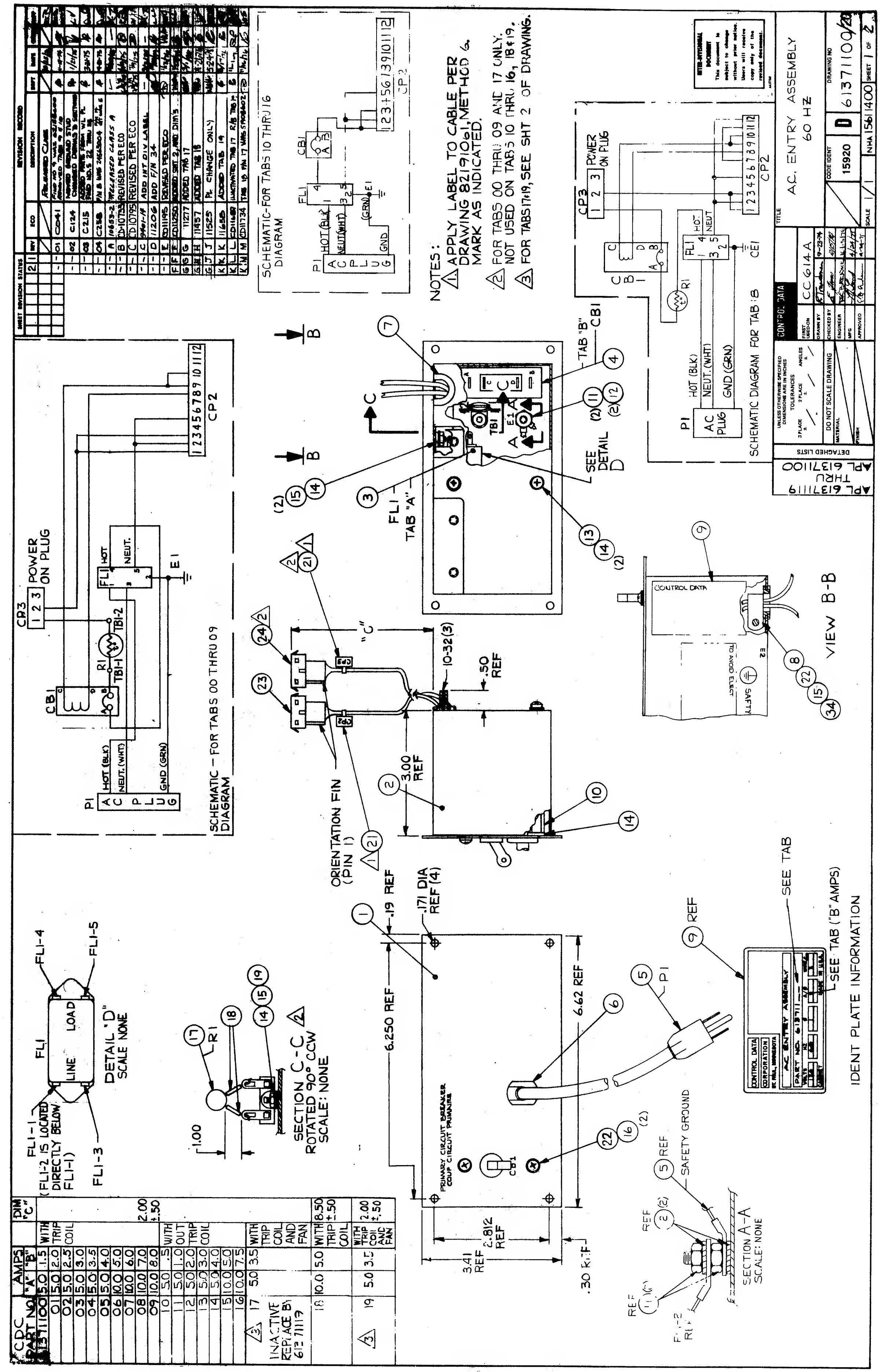
BUILD ARC 440

ASSEMBLY PARTS LIST

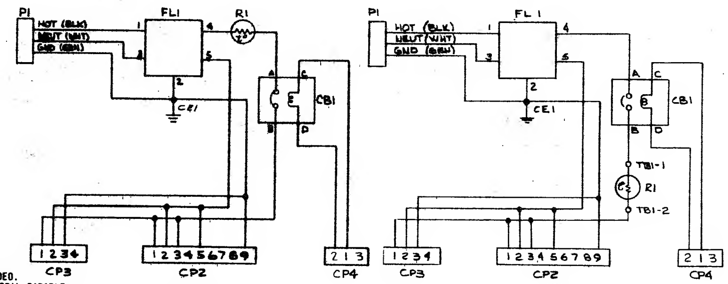
PRINT DATE	PAGE	FILE CHANGE NO.
12-15-77	3	00012648

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE
0860	15630612	8	G	D	TERM, TKTRN OSPL 60HZ (TA)	N	REL	08-18-76	CC0178	12-15-77

T	FIND NO	LI	PART NUMBER	CD	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	057	01	61407421	9	1	PC	POWER SUPPLY ASSY	A						
	059	03	95558018	8	291	FT	TAPE, COPPER FOIL W 1.00	B		11774			7732	
	060	01	66299500	0	REF	PC	SPL DISPLAY TERMINAL	D						
	061	01	66299263	5	REF	PC	GENEALOGY	D						
	062	02	51004063	7	050	OZ	ADHESIVE, SEALANT SIL RUBBER	B		12010			7717	
	063	02	51917054	2	1	PC	MAGNET BAR	F		12010			7717	
	064	02	51917051	8	1	PC	MAGNET BAR	F		12010			7717	
	065	02	51917052	6	1	PC	MAGNET BAR	F		12010			7717	
	066	02	51917053	4	1	PC	MAGNET BAR	F		12010			7717	
	067	01	16042739	9	REF	PC	GEOM DIST CORRECTION	D		12010			7717	
	068	01	16042747	2	REF	PC	RING MAGNET ADJUSTMENT SPEC	D		12010			7717	
							0052 TOTAL LINES							



A.C. ENTRY ASSEMBLY
60 HZ
DRAWING NO 61371100
CODE IDENT 15920
NHA 15611400
SHEET 1 OF 2
CONTROL DATA
REVISION RECORD
NOTES:
APPLY LABEL TO CABLE PER DRAWING 82191061, METHOD G, MARK AS INDICATED.
FOR TABS 00 THRU 09 AND 17 ONLY. NOT USED ON TABS 10 THRU 16, 18 & 19.
FOR TABS 17 & 19, SEE SHT 2 OF DRAWING.
SCHEMATIC – FOR TABS 00 THRU 09 DIAGRAM
SCHEMATIC – FOR TABS 10 THRU 16 DIAGRAM
SCHEMATIC DIAGRAM FOR TAB 18
POWER ON PLUG
HOT (BLK)
NEUT. (WHT)
GND (GRN)
DETAIL "D" SCALE NONE
SECTION C-C ROTATED 90° CCW SCALE: NONE
SECTION A-A SCALE: NONE
VIEW B-B
IDENT PLATE INFORMATION
ORIENTATION PIN (PIN 1)
SAFETY GROUND
PRIMARY CIRCUIT BREAKER
DO NOT SCALE DRAWING
DETACHED LISTS
APL 61371100 THRU APL 61371119



SCHEMATIC DIAGRAM
TAB 19

SCHEMATIC DIAGRAM
TAB 17

SPECIFICATION INFORMATION

I. INPUT

A. VOLTAGE - 96 TO 128 VOLTS.

B. CURRENT - SEE TABULATION TABLE (TABULATED FROM 1.5 TO 8.0 AMPERES MAXIMUM).

C. OVERCURRENT PROTECTION - TOGGLE CIRCUIT BREAKER INCLUDED. TABS 00-09 & 17-19 ARE WITH THE RELAY TRIP COIL CAPABLE OF TRIPPING CIRCUIT BREAKER FROM AN EXTERNAL SOURCE. FOR DETAILED INFORMATION ON CIRCUIT BREAKER SEE CDC-DWG 51807700.

D. FREQUENCY - 47 TO 440 HZ.

II. RFI - RFI FILTER IS FURNISHED TO REDUCE BOTH SUSCEPTABILITY AND CONDUCTED EMISSIONS. FOR DETAILED INFORMATION ON THE RFI FILTER SEE CDC-DWG 51899700.

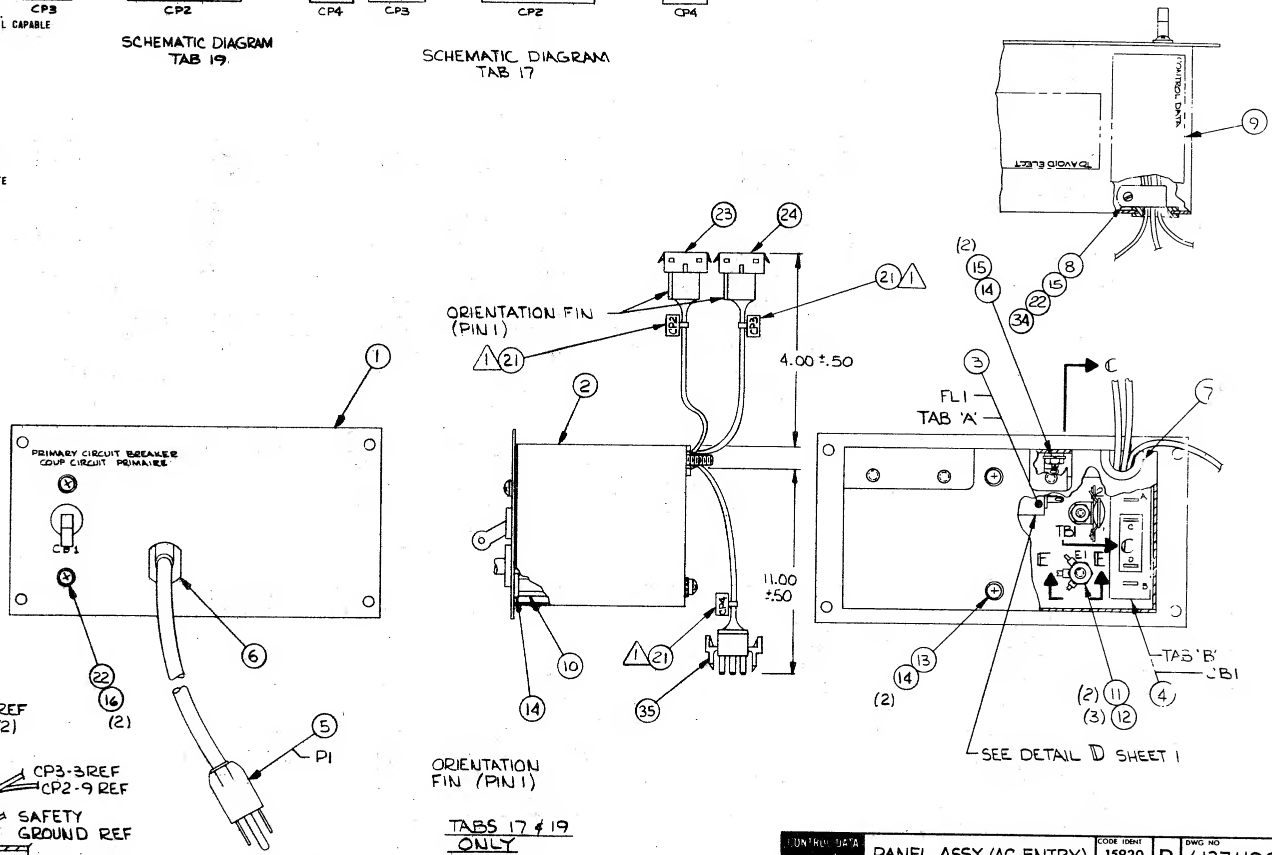
III. UL AND CSA INFORMATION - THIS ASSEMBLY SHALL BE CONSTRUCTED WITH UL RECOGNIZED POWER CORD, RFI FILTER AND CIRCUIT BREAKER SWITCH. IT SHALL BE CONSTRUCTED TO FACILITATE UL RECOGNITION IN THE EQUIPMENT.

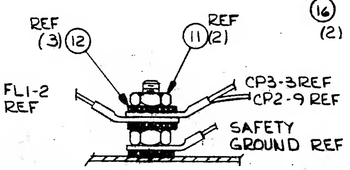
IV. PHYSICAL DIMENSIONS - THE APPROXIMATE SIZE 3.41 X 6.62 X 3.5. REFER TO DRAWING, SHEET 1.

APPLICABLE DOCUMENTS

CDC-DWG 51899700 FILTER, RFI 115-275 VAC

CDC-DWG 51907700 CIRCUIT BREAKER WITH TRIP COIL





SECTION E-E
SCALE: NONE

REVISION RECORD						
REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP

CONTROL DATA	PANEL ASSY (AC ENTRY) 60 HZ	CODE IDENT 15920	D	DWG NO 61371100	REV K
				SHEET 2	

ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
10-18-76	1	0011734A

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE
0848	61371119	1	M	D	PANEL ASSY (AC ENTRY) 60 HZ	A	REL	04-28-75	LTAT	10-18-76

T	FIND NO	LI	PART NUMBER	CD	M	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	001	01	71455100	9		1	PC	PLATE, AC ENTRY 60HZ (CRS)	P						
	002	01	71455000	1		1	PC	COVER AC ENTRY	P						
	003	01	51899703	6		1	PC	FILTER, RFI 5A 115-275V SLD	P						
	004	01	51907705	1		1	PC	CB TRIP COIL 275V 3.5AMP	P						
	005	01	51899900	8		1	PC	CORD, 3 WIRE PWR UL 9FT GRA	P						
	006	01	36158909	6		1	PC	BUSHING, STRAIN-REL BLK NYL	B						
	007	01	51809821	5		167	FT	CHAN, RUBBER 1/32 SLT EXTR U	B						
	008	01	24565003	1		1	PC	CLAMP, 5/16DIA CABLE BLK NYLO	B						
	009	01	15010500	5		1	PC	ID PLATE, CABINET SMALL VINYL	P						
	010	01	36053425	9		1	PC	STANDOFF, HEX CFS 6-32X3.000	P						
	011	01	10125108	0		2	PC	NUT HEX MCH 10-32 STL CP OR Z	B						
	012	01	10126403	4		3	PC	WSHR NO.10 EXT TOOTH LK TYP A	B						
	013	01	10127113	8		2	PC	MSCR PAN PHL 6-32X3/8 (TYP I)	B						
	014	01	10126401	8		5	PC	WSHR NO.6 EXT TOOTH LK TYP A	B						
	015	01	10125105	6		3	PC	NUT HEX MCH 6-32 STL CP OR ZP	B						
	016	01	10127111	2		2	PC	MSCR PAN PHL 6-32X1/4 (TYP I)	B						
	017	01	51908602	9		1	PC	THMS, DISC 2.5 OHM 10P 14MW	P						
	018	01	24563704	6		067	FT	INS SLVNG HI TEMP 18AWG	B						
	019	01	36085800	5		1	PC	LUG TERMINAL STRIP	P			11658			7634
	020	01	61407541	4		REF	PC	W/L AC ENTRY PANEL 60HZ	D						
	021	01	94277409	2		3	PC	STRAP CABLE TIE TYPE 6	B						

ASSEMBLY PARTS LIST

PRINT DATE	PAGE	FILE CHANGE NO.
10-18-76	2	0011734A

DIV.	ASSEMBLY NUMBER	CD	REV.	DWG.	DESCRIPTION	MC	STATUS	STATUS DATE	ENG. RESP.	FILE DATE
0848	61371119	1	M	D	PANEL ASSY (AC ENTRY) 60 HZ	A	REL	04-28-75	LTAT	10-18-76

T	FIND NO	LI	PART NUMBER	CD	M	QUANTITY	U/M	PART DESCRIPTION	MC	YLD	ECO. NO. IN	ECO. NO. OUT	S/N	WK IN	WK OUT
	022	01	10126103	0		3	PC	WSHR NO.6 INTL TOOTH LOCK STL	B						
	023	01	51905904	2		1	PC	CONN RECPT 9 CONTACTS	P						
	024	01	51905902	6		1	PC	CONN RECPT 4 CONTACTS	P						
	025	01	51906200	4		6	PC	CONTACT, SKT 20-14GA STRIP T	P						
	026	01	62121109	3		3	PC	TERM RECP FSTN 16-14 AWG BLU	B			11658A			7634
	026	02	62121109	3		2	PC	TERM RECP FSTN 16-14 AWG BLU	B		11658A			7634	
	027	01	51797236	0		2	PC	LUG, CRMP R TERM 16-14GA 10SS	B						
	028	01	93463444	5		2	250 FT	WIR 18GA STRD YEL 300V UL PVC	W						
	029	01	93464222	4		2	FT	WIR 16GA STRD RED 300V UL PVC	W						
	030	01	93464444	4		833	FT	WIR 16GA STRD YEL 300V UL PVC	W						
	031	01	93463555	8		1	FT	WIR 18GA STRD GRN 300V UL PVC	W						
	032	01	24528617	4		333	FT	TBG, INSUL NO.6 BLK UL PVC	B						
	033	01	51797217	0		1	PC	LUG, CRMP R TERM 22-18GA 10S	B						
	034	01	10125605	5		1	PC	WSHR NO.6 TYP A PLAIN STL CP	B						
	035	01	51906001	6		1	PC	CONN PLUG 3 PIN	P						
	036	01	51906201	2		4	PC	CONTACT, SKT 20-14GA STRIP T	P						
	037	01	62121108	5		1	PC	TERM RECP FSTN 18-22 AWG RED	B		11658A			7634	
								0038 TOTAL LINES							

DWN	R Trautman	12/75
CHKD	E Grono	1/76
ENG	L Rajewsky	1/76
MFG	T Forman	2/76
APPR	E Noe	2/76

CONTROL DATA

CODE IDENT 15920

TITLE: SPL TICKETRON

FIRST USED ON: CC617A

PREFIX	DOCUMENT NO.	REV
SPL	66298750	P

SHEET 1 of 3

SHEET REVISION STATUS

3	2	1
N	J	N
N	P	P

REVISION RECORD

REV	ECO	DESCRIPTION	DRFT	DATE	APP
N	CD12424	Retyped page 1, deleted pages 4 thru 7 per ECO		7-6-77	
P	12510	F/N 9 WAS 90460400	RJH	1-5-78	

NOTES:
1. Equipment Configurator 156 30200
2. Top Level Assembly 156 30300

DETACHED LISTS

AA3180 REV. 8 71

PRINTED IN U.S.A.

CONTROL DATA CODE IDENT 15920 SHEET 2 SPL DOCUMENT NO. 66298750 REV. P

FIND NO.	PART IDENTIFICATION	QUANTITY REQUIRED	UNIT OF MEAS	NOMENCLATURE OR DESCRIPTION	SPECIFICATIONS, NOTES, OR MATERIAL
1	90445764	1		P.C. Assy 5CUD-4	Disp /Kybd IF
2	90393600	2		P.C. Assy 488D	5V Reg
3	90445754	1		P.C. Assy 4AØD — 1	Processor
4	90425500	1		P.C. Assy 5ARD-0	Stic
5	90391603	2		P.C. Assy 4ASD	RAM
6	90460522	1		P.C. Assy 5DCD-0	Capacitor Bd
7	90413100	1		P.C. Assy 4CØD	Async IF-2
8	51908902	1		Sonalert	
9	90445824	1		P.C. Assy 5CYD-1	Power Supply
10	61407429	1		Xfmr Assy 120/20V	
11					
12	90445717	1		P.C. Assy 58VD-1	Non-Composite
13	15130504	2		Regulator (+15V)	
14	61407419	1		Choke Assy	
15	61407418	1		Yoke, Assy	
16	51907303	1		CRT 12 inch Phosphor GRA P4	
17	61375200	1		Cable Assy - Intensity	Potentiometer/ Cable Assy
18	51907705	1		CB Magnetic	
19	51915101	1		Knob, Plain	
20	51886600	1		Fan	

AA3181 REV. 8 71

PRINTED IN U.S.A.

CONTROL DATA		CODE IDENT 15920	SHEET 3	S PL	DOCUMENT NO. 66298750	REV. N

FIND NO.	PART IDENTIFICATION	QUANTITY REQUIRED	UNIT OF MEAS	NOMENCLATURE OR DESCRIPTION	SPECIFICATIONS, NOTES, OR MATERIAL
21	51899703	1		Line Filter	
22	90439900	1		P.C. Assy 5CXD-0	
23	61407421	1		Power Supply Assy	
24	71491300	1		Cover, Panel Maint.	
25	51777314	4		Support, Circuit Board	
26	61407695	1		High Voltage Transformer Assy	
27	95686705	1		Cap. 3 mfd 660 VAC	
28	51585701	1		Rectifier Bridge	
29	51004063	AR		Adhesive/Sealant Silicone Rubber	
30	51917051	AR		Magnet Bar - 2.0 Gauss-Yel	
31	51917052	AR		Magnet Bar - 3.0 Gauss-silver	
32	51917053	AR		Magnet Bar - 4.0 Gauss-red	
33	51917054	AR		Magnet Bar - 5.7 Gauss-green	

AA3181 REV. 8/71

PRINTED IN U.S.A.

DWN	D. Wells	6/15/76	CONTROL DATA	TITLE	PREFIX	DOCUMENT NO.	REV
CHKD	E. Gamo	7/3/76		SPL TICKETRON	SPL	66299500	J
ENG	A.R. Yamamoto	7/9/76					
MFG	W.R. Yajima	8/17/76		FIRST USED ON		SHEET 1 of 3	
APPR			CODE IDENT 15920	CC617B			

SHEET REVISION STATUS

3	2	1
01	01	01
A	A	A
A	B	B
A	C	C
D	C	D
D	E	E
F	E	F
G	E	G
H	E	H
H	J	J

REVISION RECORD

REV	ECO	DESCRIPTION	DRFT	DATE	APP
		RELEASED CLASS C		7-9-76	
01	C804	DELETED F/N 27 → 111 DELETED PAGES 4 → 7		7-14-76	
A	10843-54	RELEASED CLASS A		9/14/76	
B	11870	CHG F/N 1		11/16/76	
C	CD11692	CHG F/N 3		1-18-77	
D	11773	F/N 29 WAS 71491201		2/11/77	
E	12001	DELETED F/N 11 F/N 16 WAS 51907300		3/23/77	
F	12115	F/N 26 WAS 61417417		5/5/77	
G	12010	REVISED PER ECO		6-7-77	
H	12190	ADDED F/N 32		6/14/77	
J	12510	F/N 9 WAS 90460400	RJH	1-5-78	

NOTES:
1. Equipment Configurator 15630611
2. Top Level Assembly 15630612

DETACHED LISTS

AA3180 REV. 8 71

PRINTED IN U.S.A.

CONTROL DATA	CODE IDENT 15920	SHEET 2	SPL	DOCUMENT NO. 66299500	REV. J

FIND NO.	PART IDENTIFICATION	QUANTITY REQUIRED	UNIT OF MEAS	NOMENCLATURE OR DESCRIPTION	SPECIFICATIONS, NOTES, OR MATERIAL
1	90445764	1		P.C. Assy 5CUD-4	Disp/Kybd IF
2	90393600	1		P.C. Assy 4BBD	5V Reg
3	90445754	1		P.C. Assy 4AQD-1	Processor
4	90425500	1		P.C. Assy 5ARD-0	Stic
5	95686705	1		Cap 3 uf 660 VAC	
6	90460522	1		P.C. Assy 5DCD-0	Capacitor Bd
7	90413100	1		P.C. Assy 4CQD	Async IF-2
8	51908902	1		Sonalert	
9	90445824	1		P.C. Assy 5CYD-1	Power Supply
10	61407429	1		Xfmr Assy 120/20V	
11					
12	90445717	1		P.C. Assy 5BVD-1	Non-Composite
13	15130504	2		Regulator (+15V)	
14	61407419	1		Choke Assy	
15	61407418	1		Yoke, Assy	
16	51907303	1		CRT 12 inch Phosphor 6RA P4	
17	61375200	1		Cable Assy - Intensity	Potentiometer/ Cable Assy
18	51907705	1		CB Magnetic	
19	51915101	1		Knob, Plain	
20	51886600	1		Fan	

AA3181 REV. 8 71

PRINTED IN U.S.A.

CONTROL DATA		CODE IDENT 15920	SHEET 3	SPL	DOCUMENT NO. 66299500	REV. H

FIND NO.	PART IDENTIFICATION	QUANTITY REQUIRED	UNIT OF MEAS		NOMENCLATURE OR DESCRIPTION	SPECIFICATIONS, NOTES, OR MATERIAL
21	51899703	1			Line Filter	
22	90439900	1			P.C. Assy 5CXD-0	Maint Panel
23	61407421	1			Power Supply Assy	
24	71491300	1			Cover Panel Maint.	
25	51585701	1			Rectifier Bridge	
26	61407695	1			High Voltage Transformer Assy	
27	51004063	AR			Adhesive/ Sealant Silicone Rubber	
28						
29	51917051	AR			△ △ 2.0 △	YEL
30	51917052	AR			△ △ 3.0 △	SILVER
31	51917053	AR			△ △ 4.0 △	RED
32	51917054	AR			△ △ 5.7 △	GREEN
33	51777314	4			SUPPORT, CIRCUIT BOARD	

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CONTROL DATA		CODE IDENT 15920	SHEET 3	SPL	DOCUMENT NO. 66299500	REV. H

FIND NO.	PART IDENTIFICATION	QUANTITY REQUIRED	UNIT OF MEAS		NOMENCLATURE OR DESCRIPTION	SPECIFICATIONS, NOTES, OR MATERIAL
21	51899703	1			Line Filter	
22	90439900	1			P.C. Assy 5CXD-0	Maint Panel
23	61407421	1			Power Supply Assy	
24	71491300	1			Cover Panel Maint.	
25	51585701	1			Rectifier Bridge	
26	61407695	1			High Voltage Transformer Assy	
27	91004063	AR			Adhesive/ Sealant Silicone Rubber	
28						
29	51917051	AR			△ △ 2.0 △	YEL
30	51917052	AR			△ △ 3.0 △	SILVER
31	51917053	AR			△ △ 4.0 △	RED
32	51917054	AR			△ △ 5.7 △	GREEN
33	51777314	4			SUPPORT, CIRCUIT BOARD	

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WIRE LISTS 8

Wire list information applicable to the display terminal is contained in section 5, Diagrams, of this manual in the form of module interconnection diagrams.

INTERFACE CONNECTOR PIN ASSIGNMENTS A

This appendix contains the pin assignments of the display terminal connectors that are used to make external interface connections. This information is provided as follows:

- Table A-1 lists the pin assignments of the keyboard module connector located at the bottom right front of the display terminal.
- Table A-2 lists the pin assignments of the external modem connector on the connector panel located at the rear of the display terminal.
- Table A-3 lists the pin assignments of the printer or ticket printer controller connector on the connector panel.
- Table A-4 lists the assignments of the terminal block on the connector panel for connection of the telephone line when an internal modem is used.

TABLE A-1. KEYBOARD CONNECTOR SIGNAL PIN ASSIGNMENTS

PIN NUMBER	SIGNAL NAME	SIGNAL DIRECTION
1	Not Assigned	
2	Keyboard Data 2^7	Input
3	2^6	Input
4	2^5	Input
5	2^4	Input
6	2^3	Input
7	2^2	Input
8	2^1	Input
9	Keyboard Data 2^0	Input
10	Keyboard Strobe	Input
11	Status A	Input
12	Status B	Input
13	Not Assigned	—
14	Not Assigned	—
15	Signal Ground	Not Applicable
16	Signal Ground	Not Applicable
17	Signal Ground	Not Applicable
18	Signal Ground	Not Applicable
19	Keylock In	Not Applicable
20	Frame Ground	Not Applicable
21	Keylock Out	Not Applicable
22	Not Assigned	—
23	+5-V dc	Output
24	Ground	Not Applicable
25	-12-V dc	Output

TABLE A-2. MODEM CONNECTOR SIGNAL PIN ASSIGNMENTS

PIN NUMBER	SIGNAL NAME	SIGNAL DIRECTION
1	Frame Ground	Not Applicable
2	Transmit Data	Output
3	Receive Data	Input
4	Request to Send	Output
5	Clear to Send	Input
6	Data Set Ready	Input
7	Signal Ground	Not Applicable
8	Carrier On	Input
9	Not Assigned	—
10	Not Assigned	—
11	Not Assigned	—
12	Secondary Carrier On	Input
13	Not Assigned	—
14	Not Assigned	—
15	Not Assigned	—
16	Not Assigned	—
17	Not Assigned	—
18	Not Assigned	—
19	Secondary Request to Send	Output
20	Data Terminal Ready	Output
21	Not Assigned	—
22	Ring Indicator	Input
23	Not Assigned	—
24	Not Assigned	—
25	Not Assigned	—

TABLE A-3. PRINTER CONNECTOR SIGNAL PIN ASSIGNMENTS

PIN NUMBER	SIGNAL NAME	SIGNAL DIRECTION
1	Frame Ground	Not Applicable
2	Transmit Data	Output
3	Receive Data	Input
4	Request to Send	Output
5	Clear to Send	Input
6	Data Set Ready	Input
7	Signal Ground	Not Applicable
8	Carrier On	Input
9	Not Assigned	—
10	Not Assigned	—
11	Not Assigned	—
12	Secondary Carrier On	Input
13	Not Assigned	—
14	Not Assigned	—
15	Not Assigned	—
16	Not Assigned	—
17	Not Assigned	—
18	Keylock In	Not Applicable
19	Secondary Request to Send	Output
20	Data Terminal Ready	Output
21	Not Assigned	—
22	Ring Indicator	Input
23	Not Assigned	—
24	Not Assigned	—
25	Keylock Out	Not Applicable

TABLE A-4. TELEPHONE-LINE TERMINAL BLOCK ASSIGNMENTS

TERMINAL NUMBER	TELEPHONE SIGNAL NAME AND DIRECTION	
	2-WIRE HALF-DUPLEX	4-WIRE FULL-DUPLEX
1	Not Used	Data Ring Receive (DRR) — Input
2	Not Used	Frame Ground
3	Not Used	Data Tip Receive (DTR) — Input
4	Data Ring Transmit/Receive (DTR/DRR)	Data Ring Transmit (DRT) — Output
5	Frame Ground*	Frame Ground
6	Data Tip Transmit/Receive (DTT/DTR)	Data Tip Transmit (DTT) — Output

* This is not to be mistaken for the Signal Ground (SG) interface connection used between modem module part number 51912400 and a Bell System CBS Data Coupler (see interface diagram of modem module 51912400 in section 4, Theory of Operation).

DISPLAY CHARACTER REPERTOIRE B

This appendix contains information on the display character repertoire for the display terminal. The display character repertoire consists of 96 standard ASCII alphanumeric characters and punctuation marks including a space and 16 special characters. The repertoire and its code set are shown in table B-1. The code set shown in the table is in binary. Shown in figures B-1 and B-2 are the dot matrix patterns of the repertoire with figure B-1 showing the patterns for the 80 character display format and figure B-2 showing the patterns for the 40 character display format. Note that in the 80 character format, the symbol generation circuitry of the display terminal employs a 7- by 9-dot matrix, and in the 40 character format, it employs a 14- by 18-dot matrix. The codes of the repertoire code set that appear on the two figures are in hexadecimal.

TABLE B-1. DISPLAYABLE CODES

BITS				b_7 → b_6 → b_5 →	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
b_4 ↓	b_3 ↓	b_2 ↓	b_1 ↓	ROW ↓ COL →	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL		SP	0	@	P	`	p
0	0	0	1	1	SOH		!	1	A	Q	a	q
0	0	1	0	2	STX		"	2	B	R	b	r
0	0	1	1	3	ETX		#	3	C	S	c	s
0	1	0	0	4	EOT		$	4	D	T	d	t
0	1	0	1	5	ENQ		%	5	E	U	e	u
0	1	1	0	6	ACK		&	6	F	V	f	v
0	1	1	1	7	BEL		'	7	G	W	g	w
1	0	0	0	8	BS		(	8	H	X	h	x
1	0	0	1	9	HT		)	9	I	Y	i	y
1	0	1	0	10{A}	LF		*	:	J	Z	j	z
1	0	1	1	11{B}	VT		+	;	K	[	k	{
1	1	0	0	12{C}	FF		,	<	L	\	l	|
1	1	0	1	13{D}	CR		-	=	M	]	m	}
1	1	1	0	14{E}	SO		.	>	N	^	n	~
1	1	1	1	15{F}	SI		/	?	O	_	o	DEL

01692

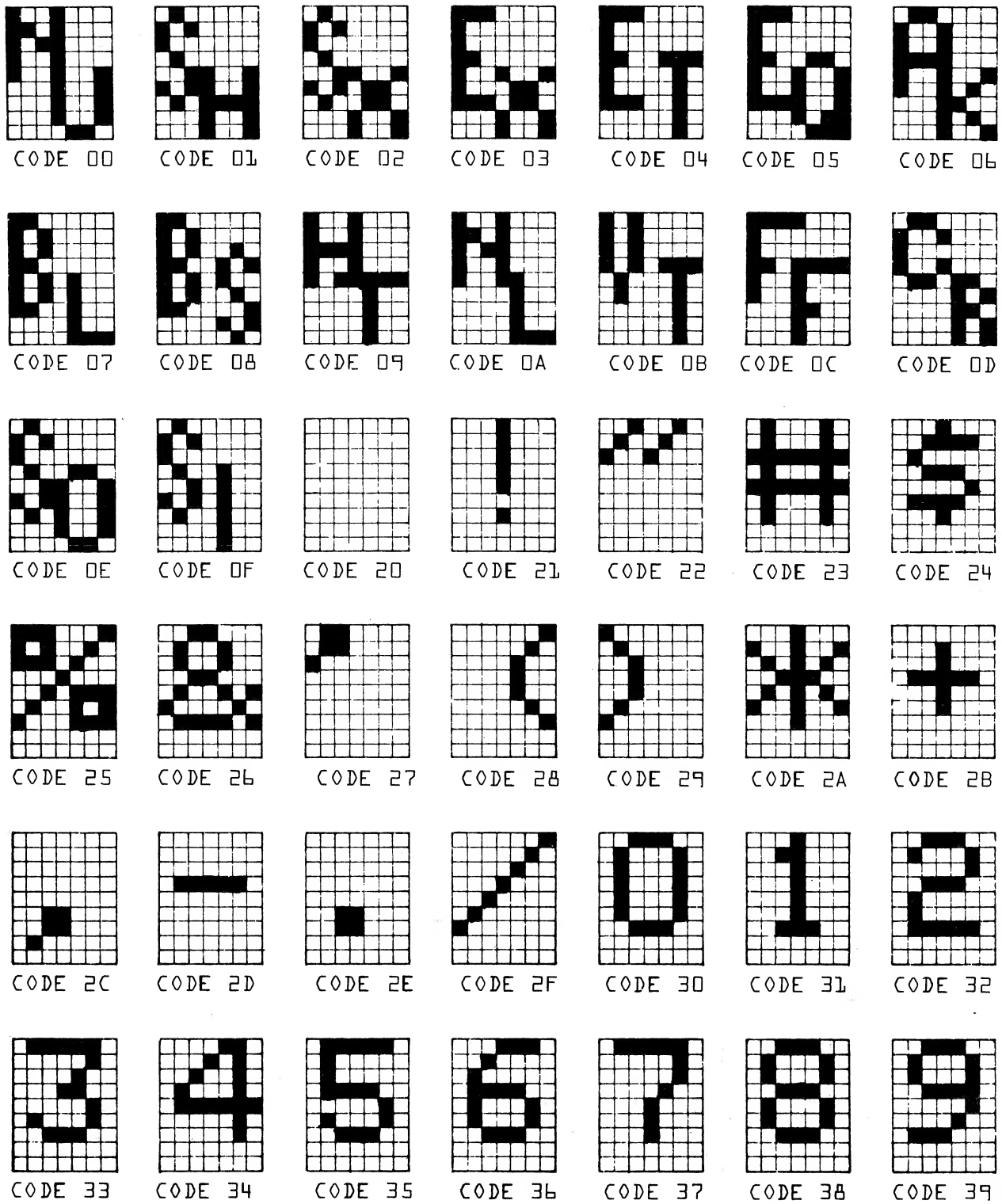

Figure B-1. Dot Matrix in 80 Character Display Format

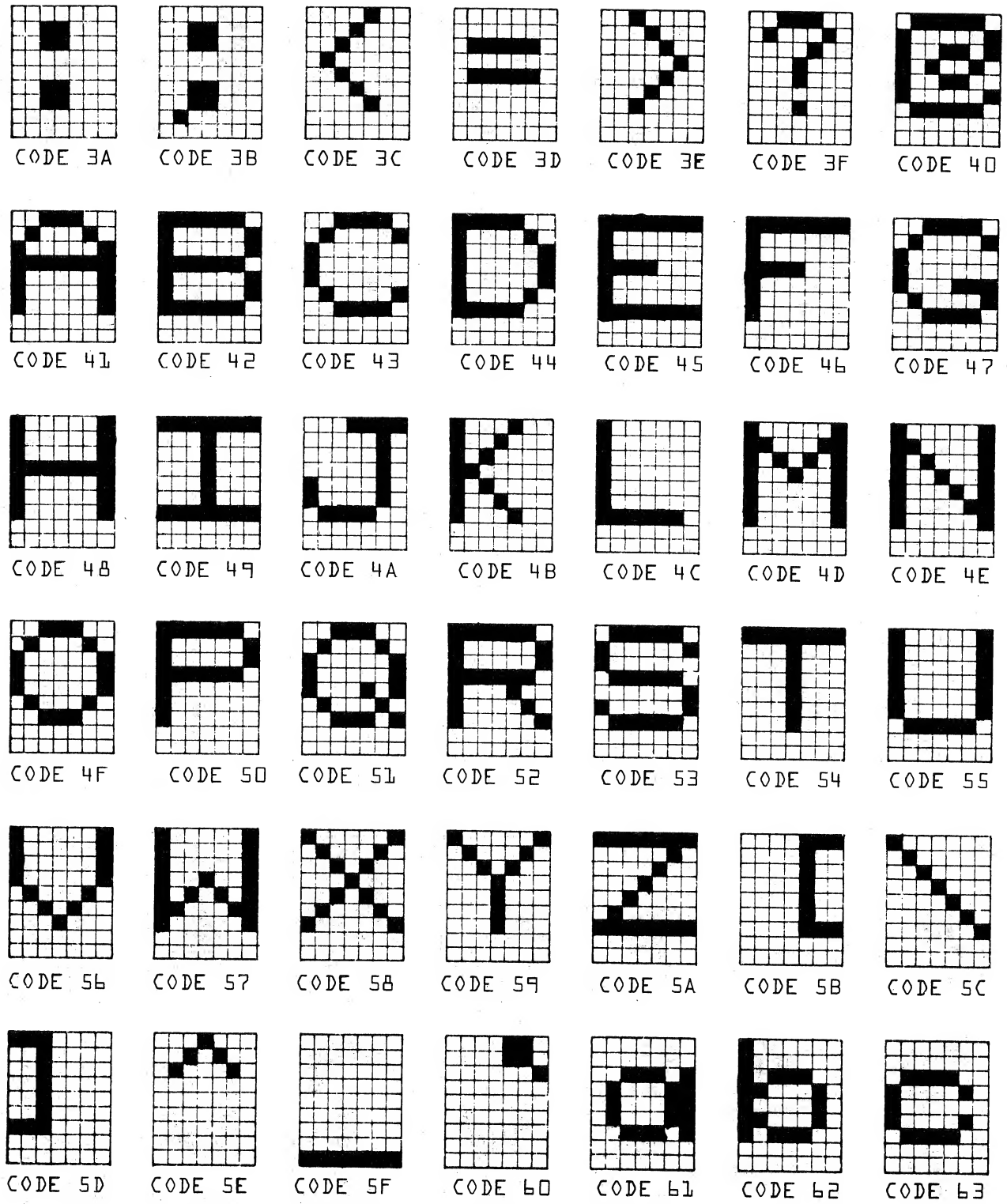

Figure B-1. Dot Matrix in 80 Character Display Format (Contd)

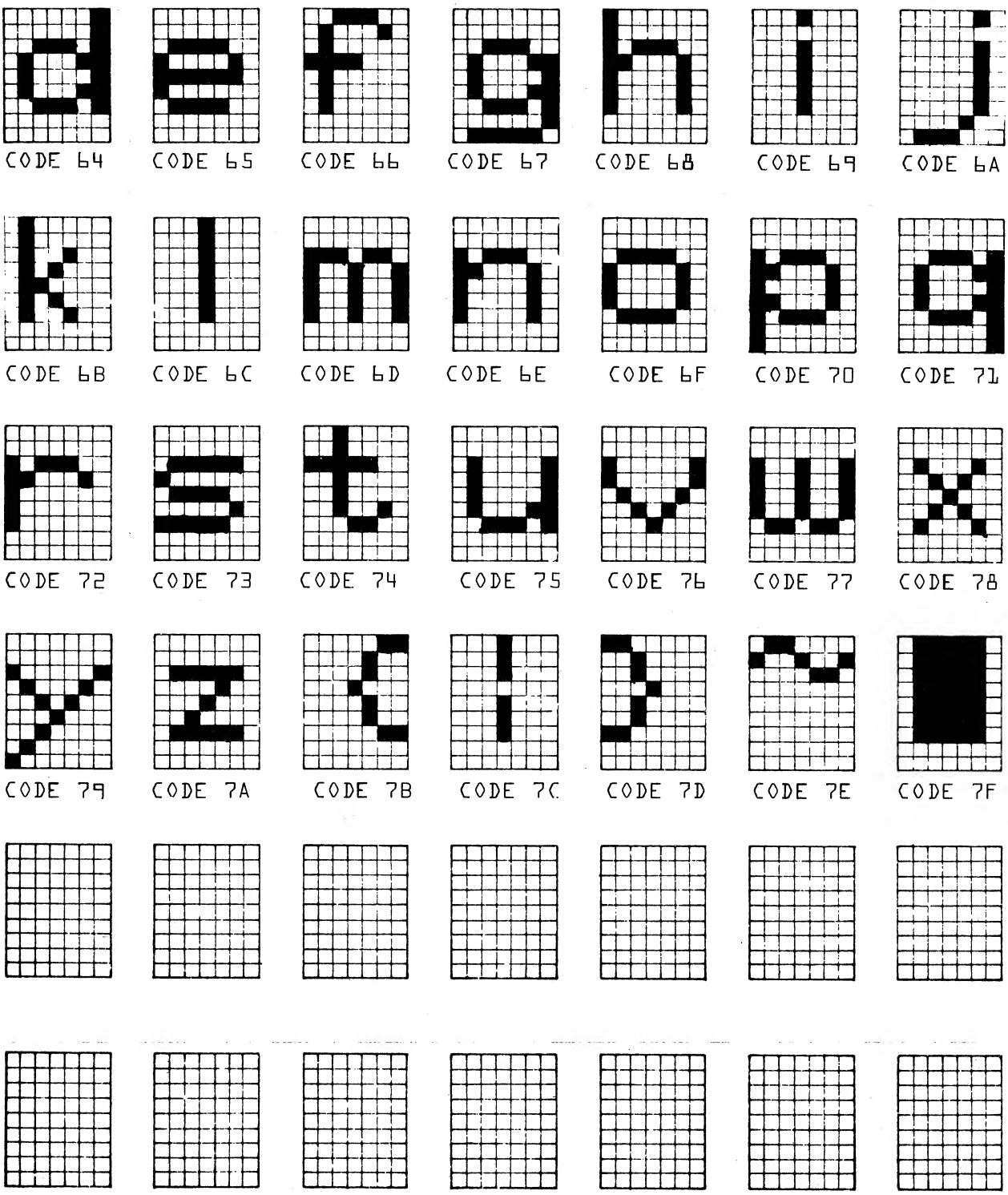

Figure B-1. Dot Matrix in 80 Character Display Format (Contd)

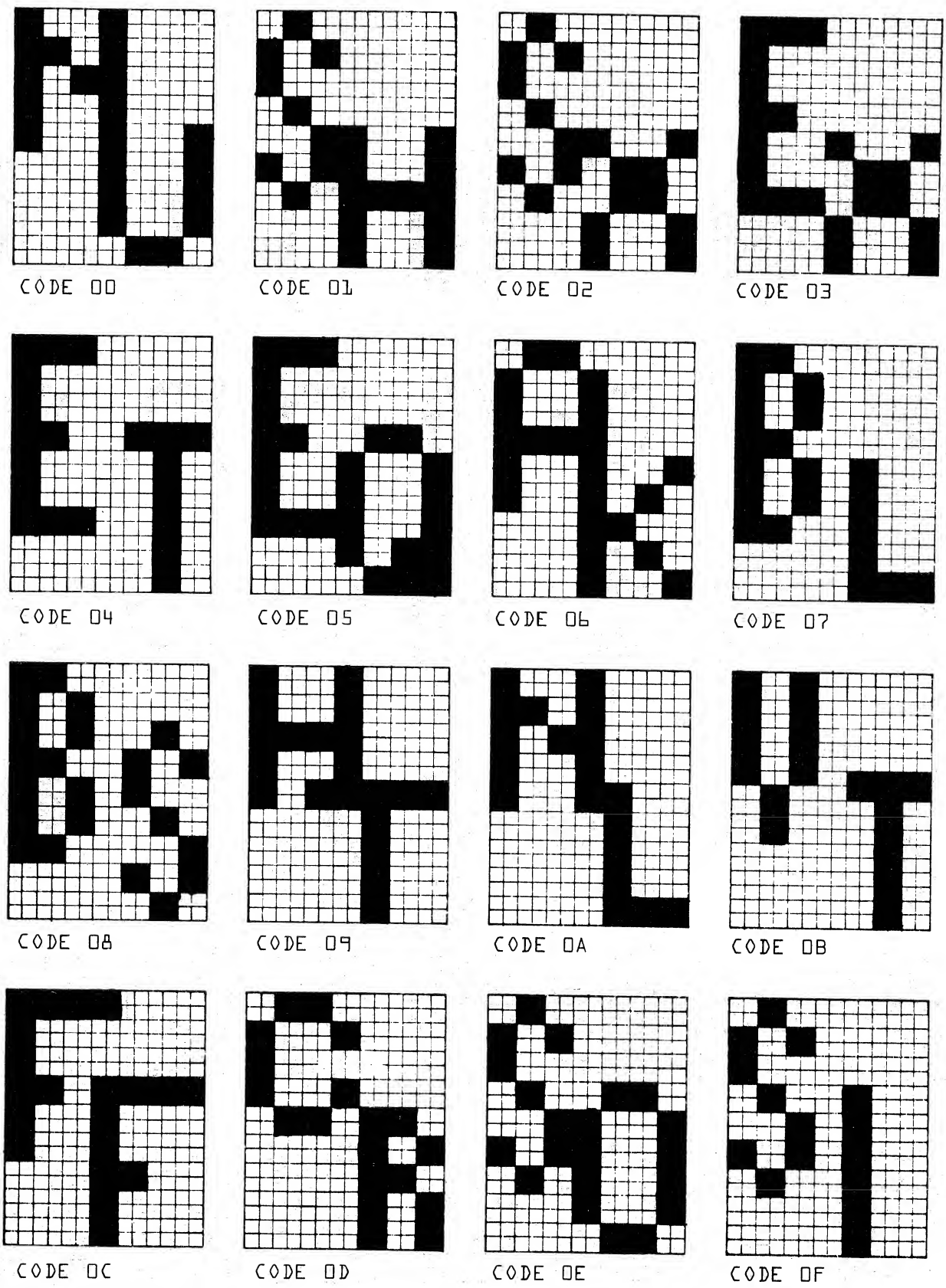

Figure B-2. Dot Matrix in 40 Character Display Format

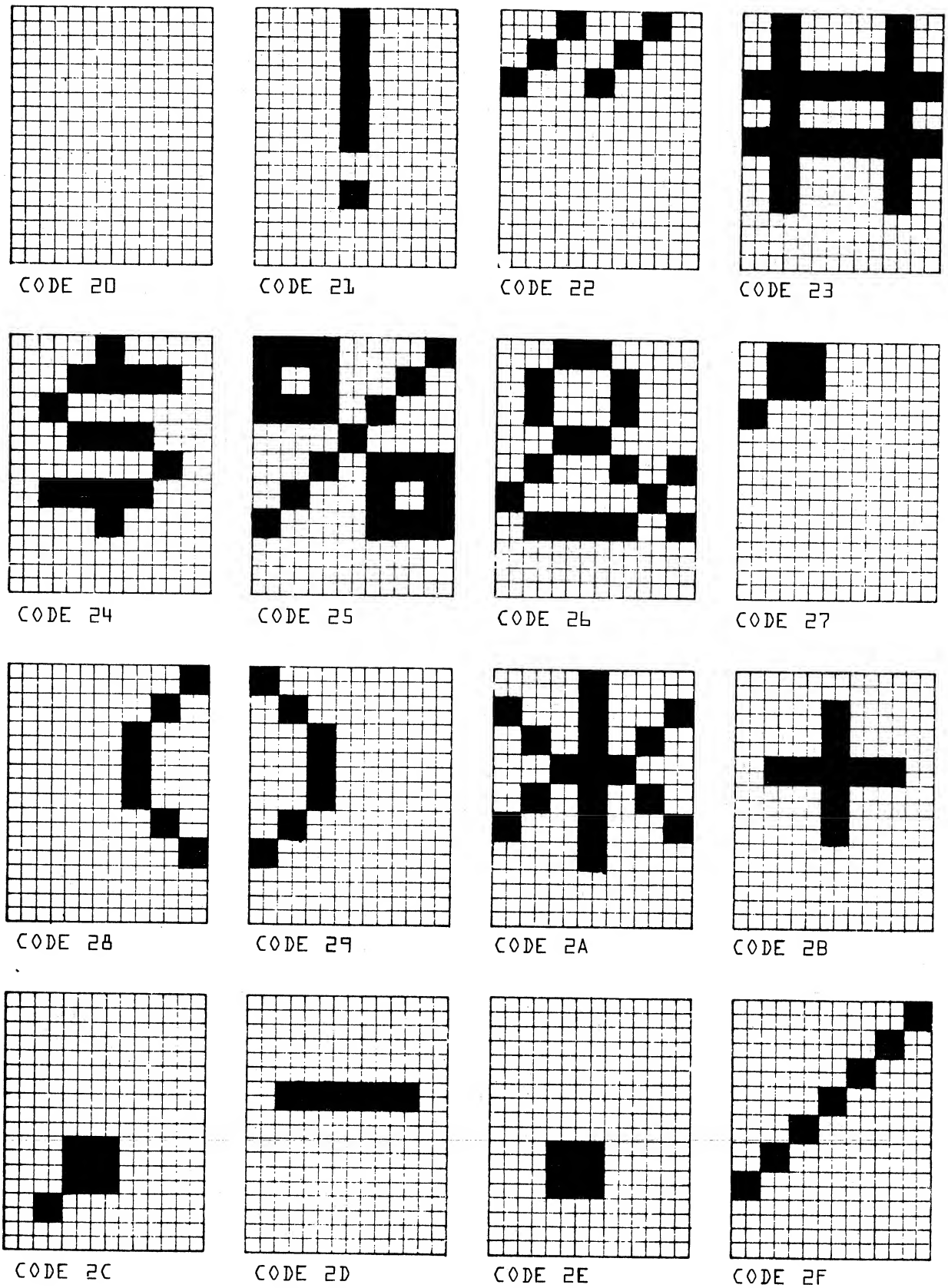

Figure B-2. Dot Matrix in 40 Character Display Format (Contd)

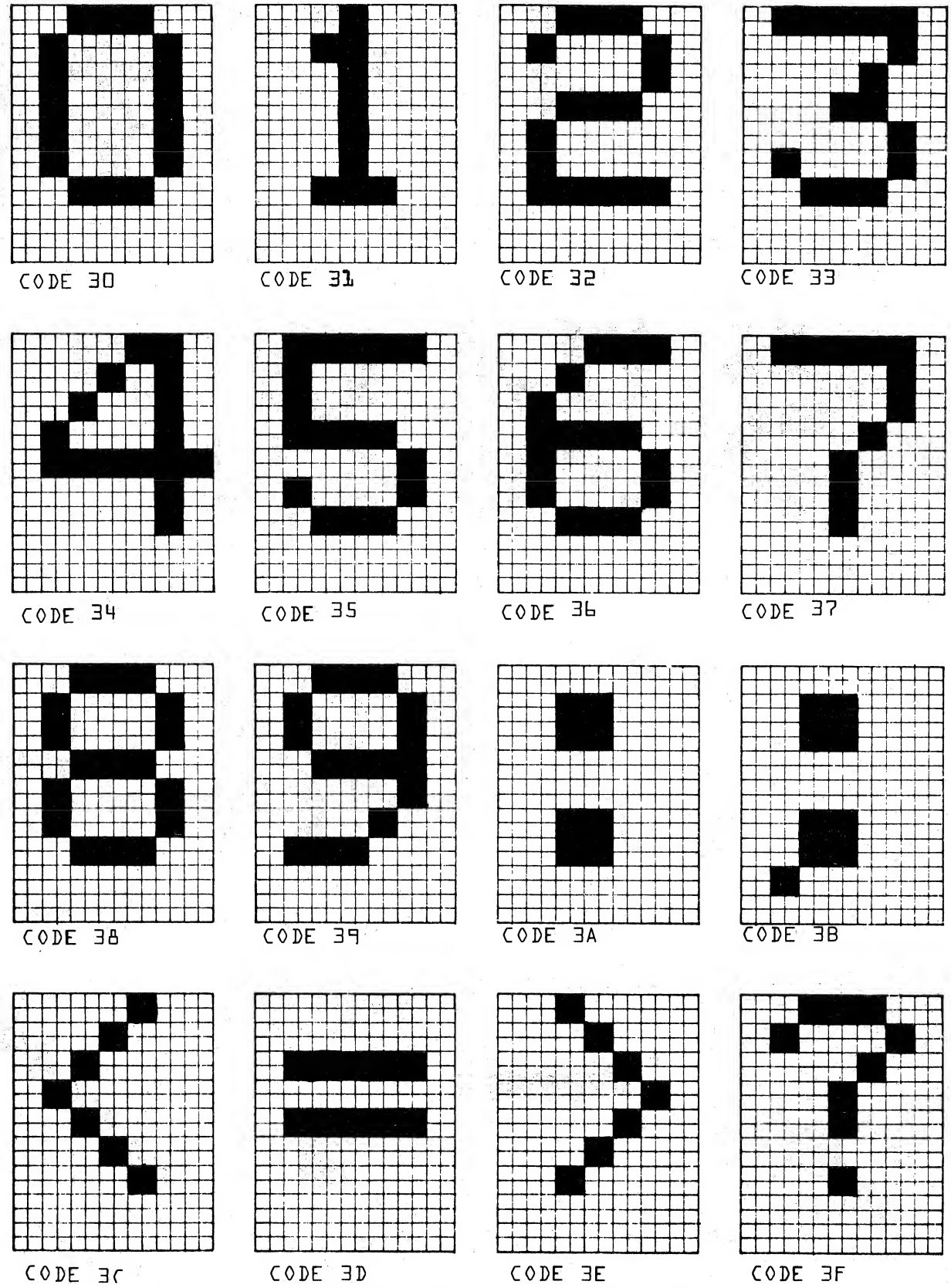

Figure B-2. Dot Matrix in 40 Character Display Format (Contd)

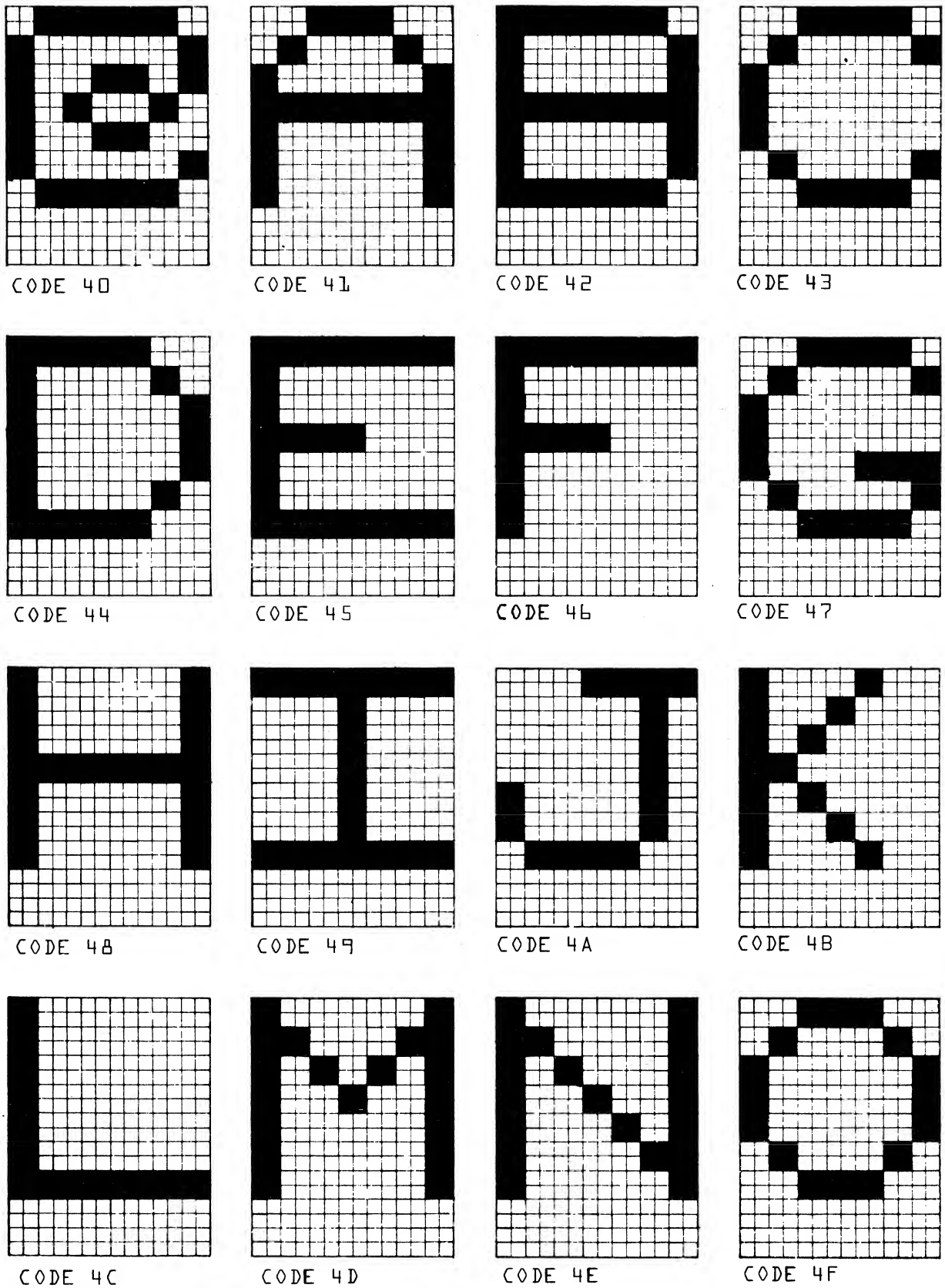

Figure B-2. Dot Matrix in 40 Character Display Format (Contd)

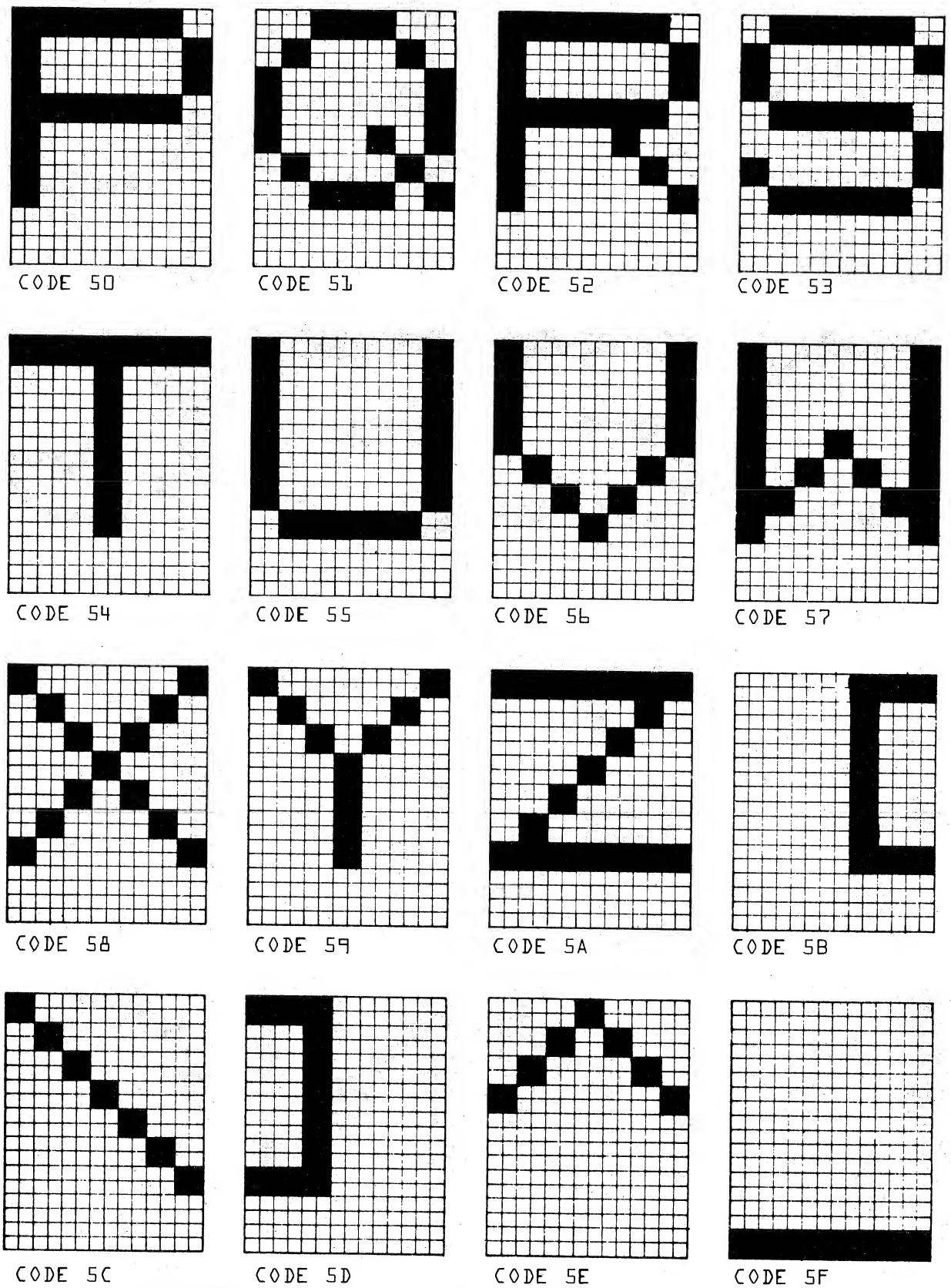

Figure B-2. Dot Matrix in 40 Character Display Format (Contd)

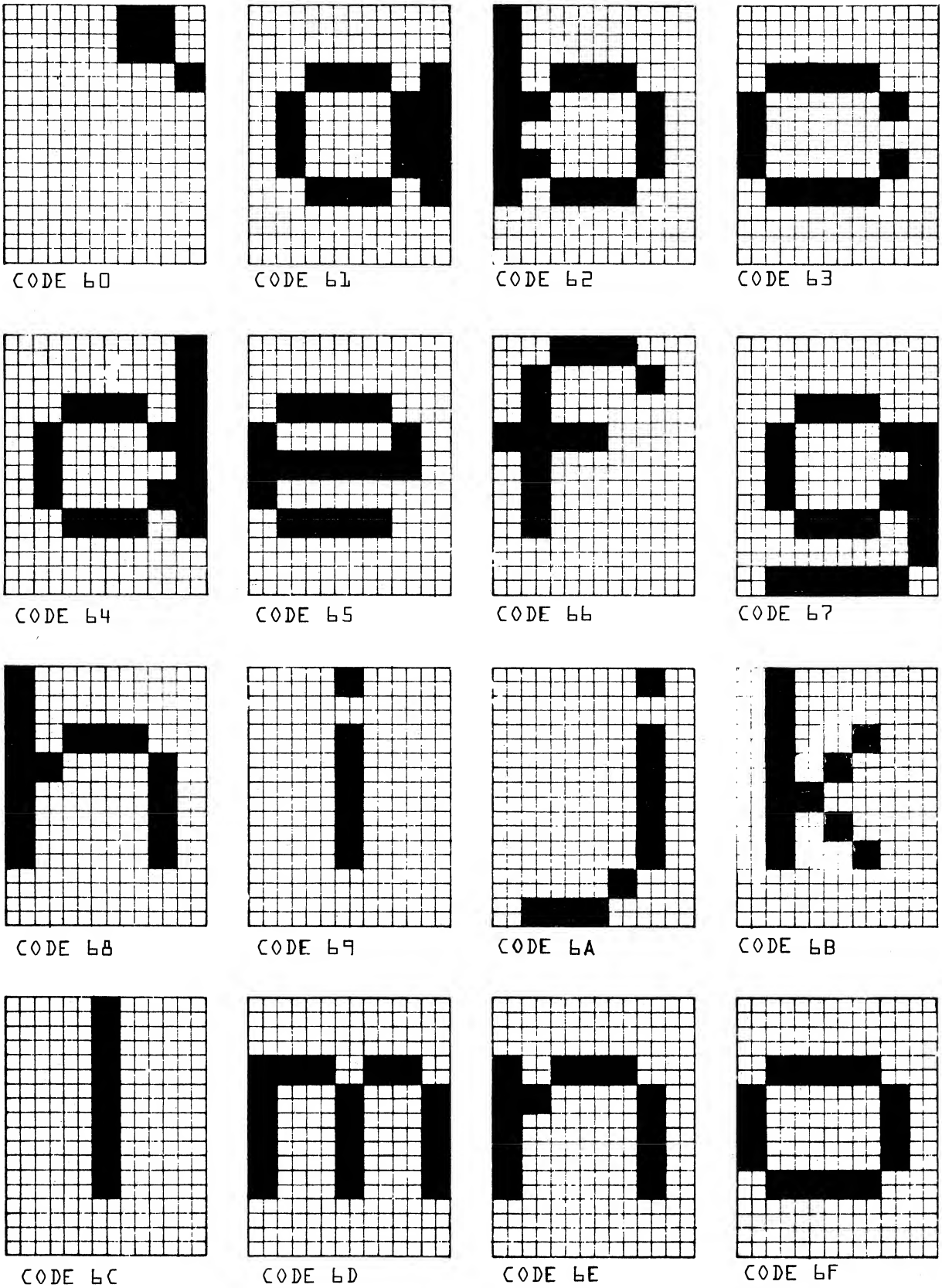

Figure B-2. Dot Matrix in 40 Character Display Format (Contd)

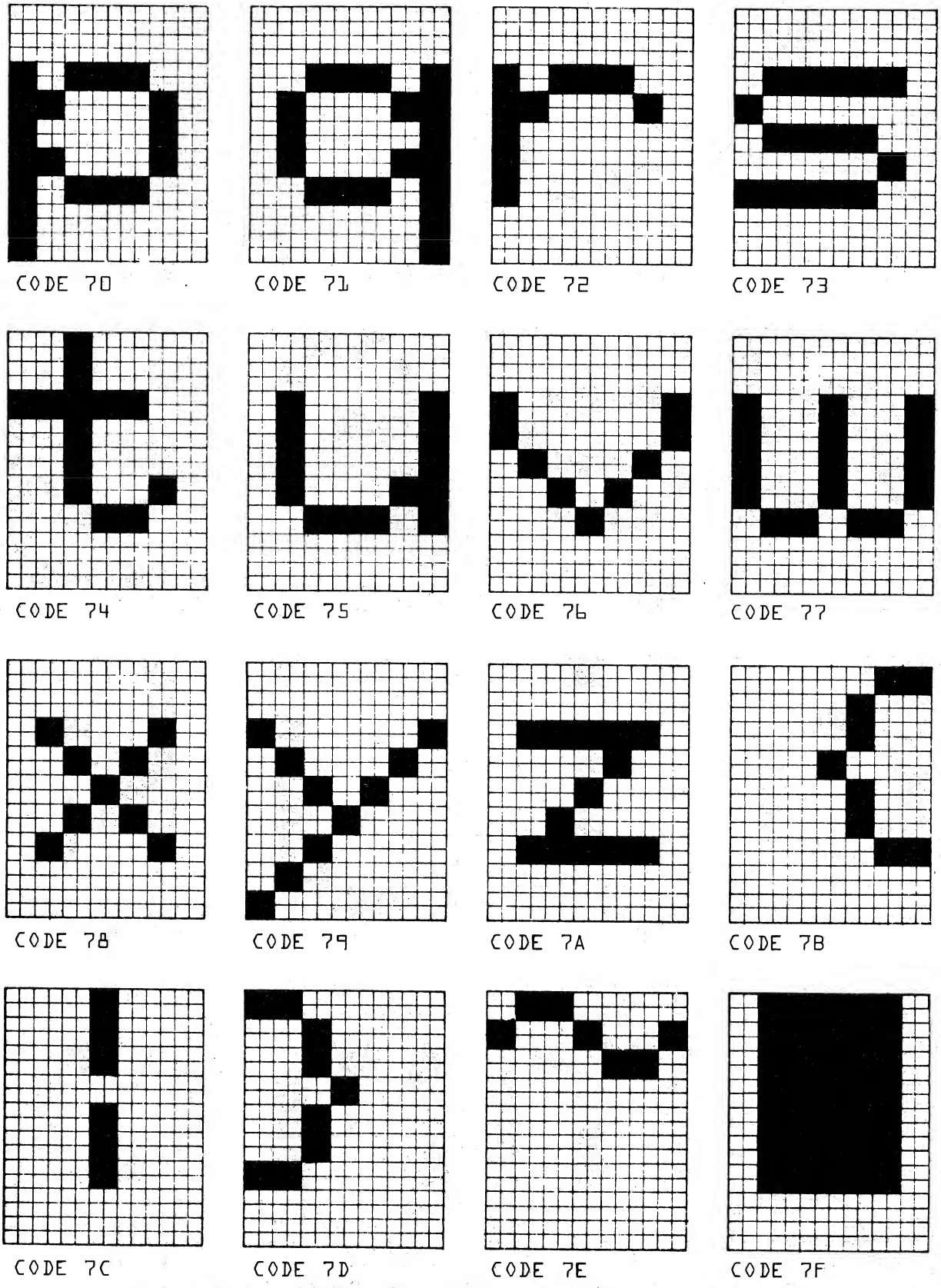

Figure B-2. Dot Matrix in 40 Character Display Format (Contd)

TICKETRON DIAGNOSTICS AND AUTOLOAD C

This appendix contains a description of the diagnostic-autoload sequence of the firmware program that is employed in the Ticketron application of the display terminal. Included as part of the description is the effect and characteristics that each section of the program introduces to the display terminal as they are executed. The execution of the diagnostic-autoload sequence occurs during display terminal intialization following a power-on master clear or a manual reset; or during manual intervention when the maintenance panel switches are used to reinstate a selected section of the diagnostic program or to cause the autoload program to reload a page of the applications program.

QUICKLOOK DIAGNOSTIC

A quicklook diagnostic is provided that does a short self-diagnostic of the display terminal hardware before loading the applications program. This diagnostic and autoload program is resident in nonvolatile ROM. It is entered in power on and manual reset situations.

The quicklook diagnostic has the following test sections:

- Test 001 — ROM checksum test
- Test 002 — RAM memory test
- Test 003 — Command test
- Test 004 — Async comm channel test
- Test 005 — Display test
- Test 006 — Keyboard test
- Test 007 — Ticket printer test
- Test 010 — Matrix printer test

These tests may be selectively executed through use of the maintenance panel switches. Refer to procedure CRT1, Executing Quicklook Diagnostic in section 6, for applicable switch settings.

During normal operation, all maintenance panel switches are in the logical 0 position (switches 0 through 7 placed to the left). Then upon a power-on application or manual reset, the quicklook-autoload program is executed in the following sequence:

1) The program automatically sequences through quicklook tests 001 through 005.
2) After finishing quicklook test 005, the autoload program is automatically initiated.
3) The autoload program initially requests and loads the load page of the applications program.
4) Then, using the load page as a table, the autoload program requests and loads all pages of program 1.
5) When program 1 has been loaded, the autoload jumps to the start of program 1 for execution.

QUICKLOOK TEST DESCRIPTIONS

Quicklook tests are described in following paragraphs.

Test 001

This is the ROM checksum test. It checks that the ROM program (quicklook and autoload) in the terminal is correct. When the test starts, T001 is displayed in the upper-left corner of the crt (termed a microdisplay) and the bit pattern 0000 0001 appears in the upper row of LEDs on the maintenance panel. Test 001 requires less than a second to execute. If the test completes successfully, the quicklook program automatically jumps to test 002. If a ROM checksum error occurs, the microdisplay changes to T001X, and the test halts. The bit pattern 0000 0001 remains in the upper row of LEDs.

Test 001 will be performed even if the crt itself is not functioning. In this case, the bit pattern 0000 0001 in the upper row of LEDs indicates that test 001 is being performed. If this bit pattern persists, and is not replaced by the test 002 bit pattern within a second, then a test 001 failure has occurred.

Test 001 is in the nature of a self-check diagnostic, resident in ROM, which checks the validity of ROM. It can detect only minor errors in ROM. If there is an extensive malfunction of ROM, or if an error occurs in the part of ROM used for storage of test 001, then the indications produced by test 001 will be indeterminate.

However, in such a case, it is unlikely that the terminal will complete test 001 and automatically advance to test 002. The fact that the terminal does not complete test 001 and advance to test 002 indicates some sort of malfunction in the terminal. Following are possible causes of such a malfunction.

- Memory error in one or more of the ROM program bytes which comprise the test 001 program.
- Wrong PROM chip or chips installed on the ROM module of the CC617-A model or program memory module of the CC617-B model, or PROM chip or chips missing all together.
- Massive failure of ROM, or the ROM module of the CC617-A model is not installed in the terminal.
- Failure in the RAM module at location 04 of the CC617-A model, or the RAM module is missing all together. This RAM module in the CC617-A model or its corresponding RAM segment of the program memory module in the CC617-B model contains page 20. Locations 000_8 through 077_8 of this page comprise the stack area used by the processor module in the execution of test 001.
- Failure of the processor module or the STIC module so that program is not executed or not executed correctly.
- Power supply failure.

Test 002

This is the RAM memory test. It tests that the entire 8K of terminal RAM memory is operating correctly. The test writes a pattern into RAM memory, and then reads this pattern back. When the test starts, T002 is displayed on the crt microdisplay and the bit pattern 0000 0010 appears on the top row of LEDs on the maintenance panel.

Test 002 requires about a second. If the test is completed successfully, the terminal sets every RAM location to contain 000_8, and then automatically jumps to test 003. Since the display refresh memory is part of RAM, every location in the display refresh memory now contains 000_8. A memory location containing 000_8 is displayed on the crt as the character N_U (null); hence at the successful conclusion of test 002, the crt display will be filled with a pattern of all N_U's when the display is turned on by the next text segment (test 003).

Test 002 erases whatever program previously resided in the RAM of the terminal. Test 002 is normally performed prior to loading a RAM program into the terminal; hence the erasing of the previous RAM program is not objectionable.

During the actual execution of test 002, the crt is turned off. At the conclusion of the test, the crt is turned on again. This is done to avoid confusing the operator with the peculiar crt display that is created when the random test pattern is loaded into RAM.

If an error is detected while executing test 002, the crt is turned on and the display T002X appears in the microdisplay. The diagnostic stops and the bit pattern 0000 0010 remains in the upper row of LEDs. The remainder of the crt display will contain whatever pattern resulted from loading the random test pattern into RAM.

Test 002 will be performed even if the crt is not functioning. In this case, the bit pattern 0000 0010 in the upper row of LEDs indicates that test 002 is being performed. If this pattern persists, and is not replaced by the test 003 bit pattern within a second, then a test 002 failure has occurred.

If test 001 (ROM checksum test) has executed successfully, then a test 002 failure may be due to one of the following:

- On the CC617-A model — malfunction of a single memory chip on either RAM module or falfunction of the entire module at location 05. On the CC617-B model — malfunction of the RAM of the program memory module at location 03.
- On the CC617-A model — RAM module at location 05 not installed in the terminal.

Test 003

This is the command test. It is designed to execute most of the instruction set of the processor module. Improper execution of an instruction or failure to execute an instruction are detected as errors.

When the test starts, T003 is displayed in the microdisplay of the crt and the bit pattern 0000 0011 appears in the upper row of LEDs on the maintenance panel. If test 003 is performed immediately after test 002, the remainder of the crt will be filled with the all NU pattern left over from test 002. This is normal.

Test 003 requires less than a second. If the test is completed successfully, quick-look diagnostic automatically jumps to test 004. If an error is detected, the test halts. The display T003 remains on the crt; however, no X is being displayed following the T003. The bit pattern 0000 0011 remains in the upper row of LEDs.

Test 003 will be performed even if the crt is not functioning. In this case, the bit pattern 0000 0011 in the upper row of LEDs indicates that test 003 is being performed. If this bit pattern persists and is not replaced by the test 004 bit pattern within a second, then a test 003 failure has occurred.

If test 001 and test 002 have executed successfully, then a test 003 failure is most likely due to a faulty processor module.

Test 004

This is the test of the asynchronous I/F-2 module. Each of the two ports of this module are operated in loop-back mode. Port A, the communications port, sends and receives characters with 8 data bits; port B, the interface to the TPE (old Ticketron electronics) and the matrix printer, sends and receives characters with 7 data bits.

When the test starts, T004 is displayed on the crt and the bit pattern 0000 0100 appears in the upper row of LEDs on the maintenance panel. If test 002 was previously performed, the remainder of the crt will be filled with the all NU pattern left over from test 002. This is normal.

Test 004 requires about a second. If the test is completed successfully, the terminal automatically jumps to test 005. If an error is detected, the crt microdisplay changes to T004X and the test halts. The bit pattern 0000 0100 remains in the upper row of LEDs.

Test 004 will be performed even if the crt is not functioning. In this case, the bit pattern 0000 0100 in the upper row of LEDs indicates that test 004 if being performed. If this bit pattern persists, and is not replaced by the test 005 bit pattern within about a second, then a test 004 failure has occurred.

If tests 001 through 003 have executed successfully, then a test 004 failure is most likely due to a faulty async I/F-2 module.

Note that test 004 does not check the operation of the modem.

Test 005

This is the crt display test. It is in the nature of a display rather than a test, since no automatic error detection occurs. Instead, the operator or serviceman is given the opportunity to observe the crt display and the upper row of maintenance panel LEDs to quickly determine if these displays are working correctly.

When the test starts, all eight LEDs which comprise the upper row of maintenance panel LEDs are turned on. This not only indicates that test 005 is in progress, but also provides a lamp test. The crt is filled with all A's. This pattern remains for about a second. Then the crt is filled with all B's, then all C's, then all D's, each pattern remaining for about a second before automatically sequencing to the autoload.

At the conclusion of test 005, the terminal examines maintenance panel switches 0 through 3. If these are all logical 0 (as they would be in a normal power on sequence), then the diagnostic jumps to the autoload program. The upper row of maintenance panel LEDs is turned off. The display L000 (load reference page 0) appears in the microdisplay of the crt. The remainder of the crt contains the all D's pattern left over from test 005.

If any of the maintenance panel switches 0 through 3 are a logical 1, as they would be in a selective quicklook test, then the quicklook-autoload sequence will halt at the end of test 005. The upper row of LEDs will remain on. The crt will remain at the all D's pattern. This pattern can be used to perform the crt monitor adjustments (focus, linearity, etc.).

Test 005 will be performed even if the crt is not functioning. In this case, the bit pattern of all indicators lit in the upper row of LEDs indicates that test 005 is in progress.

As previously mentioned, if any of the maintenance panel switches 0 through 3 are set to a logical 1, the diagnostic will halt at the end of test 005. To exit from this test, set the maintenance panel switches 0 through 7 as desired and toggle the maintenance panel RESET switch. The terminal will then perform the action dictated by the setting of the 0 through 7 maintenance panel switches.

Test 006

This is the keyboard test. Upon entry, the crt microdisplay will display A, followed by a code which indicates the setting of the Keylock switch on the keyboard. These codes are:

- A 000 — Keylock switch at OFF
- A 001 — Keylock switch at ON
- A 003 — Keylock switch at MGT

Then, each time a keyboard key is pressed, the crt microdisplay will display K followed by the octal code produced by the key (refer to figure C-1). If the position of the Keylock switch is changed, the crt will display A followed by the code indicating the new setting of the Keylock switch.

To exit from test 006, set the maintenance panel switches 0 through 7 as desired and toggle the maintenance panel RESET switch.

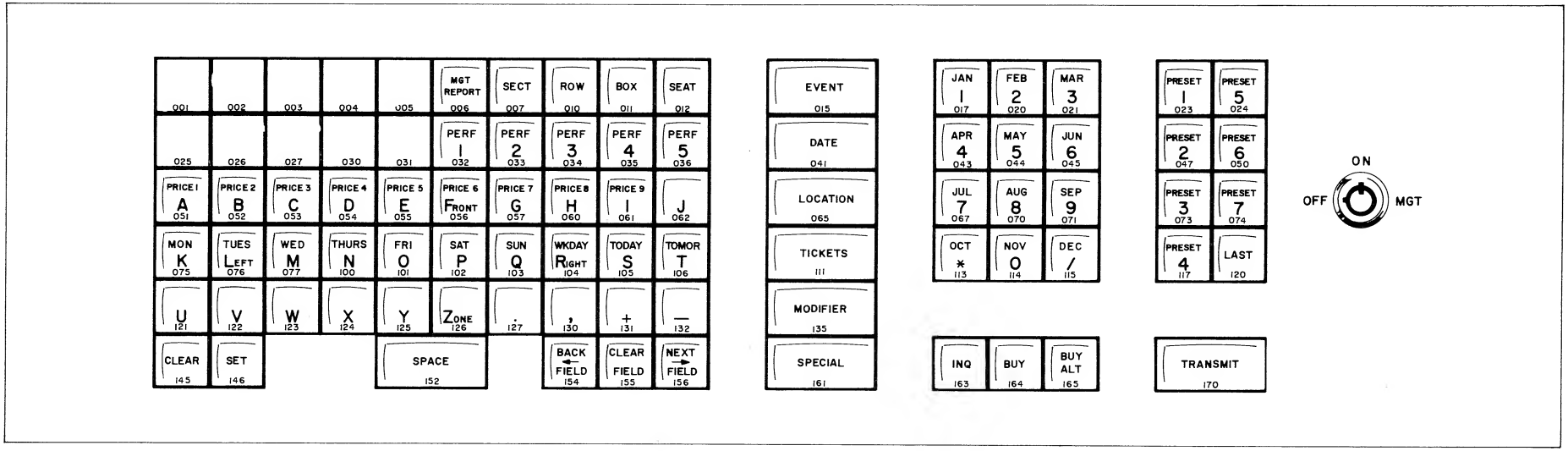

Figure C-1. Keyboard Ocatal Codes

This is the ticket printer test. Upon entry, the crt microdisplay will display T007. Then, each time a key is pressed on the keyboard, the ticket printer will produce a test ticket as shown in figure C-2.

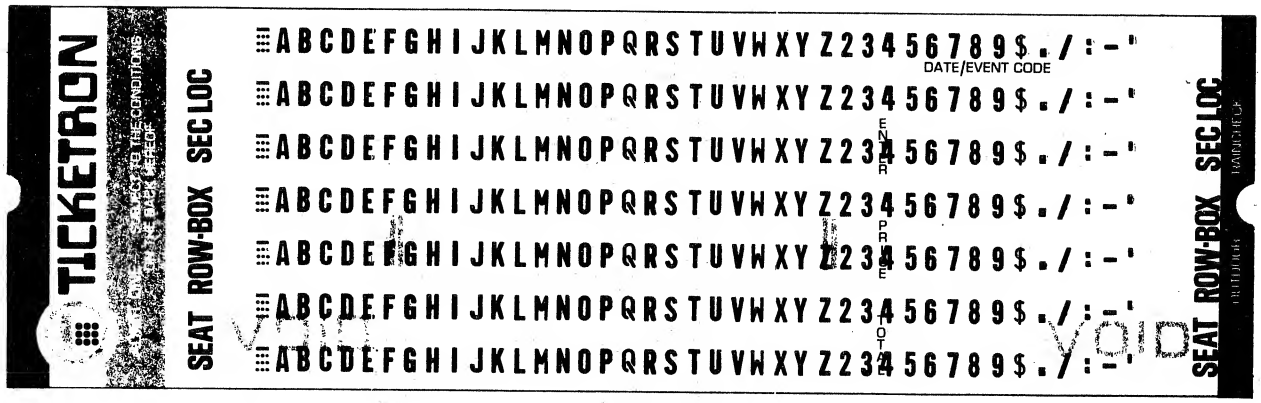

Figure C-2. Test Ticket

NOTE

Upon entry to this test, it may be necessary to press a key twice to produce the first test ticket. After that, a key need be pressed only once to produce a test ticket.

If the ticket printer is in a not ready condition when entering test 007, then the crt will display T007NR. A not ready condition may be produced by one of the following:

- TPE (old Ticketron electronics) not turned on. Turn the Keylock switch on the keyboard to ON or MGT. Make sure the TPE is plugged into an electrical outlet.
- Power switch in the ticket printer is OFF. Turn it to ON.
- Ticket printer is out of stock. Load new stock.
- Ticket printer stock is not at head of form. Press the green button to advance stock to head of form.
- One or more printer fuses are bad. Examine and replace bad fuses.

When the not ready condition is replaced by a ready condition, the NR portion of the crt display will vanish, leaving T007. Test tickets can then be produced.

NOTE

Test 007 examines for a new ready condition only at the start of the test. Thus, if test 007 is started with the printer ready, and the printer subsequently goes not ready during the progress of test 007, this fact will not be indicated. If the printer refuses to print, and the serviceman suspects that the printer has gone not ready, he can toggle the maintenance panel RESET switch without changing the settings of the maintenance panel 0 through 7 switches. This will restart test 007, and a not ready condition, if present, will be indicated by the crt display T007NR.

To exit from test 007, set the maintenance panel switches 0 through 7 as desired and toggle the maintenance panel RESET switch.

Test 010

This is the matrix printer test. Upon entry, the crt microdisplay will display T010. Then, each time a key is pressed on the keyboard, the matrix printer will print a line as follows:

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
```

02183

If the matrix printer is in a not ready condition when entering test 010, then the crt will display T010NR. A not ready condition may be produced by one of the following:

- START switch on the matrix printer is not lit. Press the START switch.
- Fuse blown in the matrix printer. Examine and replace bad fuses.

When the not ready condition is replaced by a ready condition, the NR portion of the crt display will vanish, leaving T010. The matrix printer can then be made to print lines of print by pressing a key on the keyboard.

NOTE

Test 010 examines for a not ready condition only at the start of the test. Thus, if test 010 is started with the matrix printer ready, and the matrix printer subsequently goes not ready during the progress of the test, this fact will not be indicated. If the serviceman suspects that the matrix printer has gone not ready, he can toggle the maintenance panel RESET switch without changing the settings of the maintenance panel 0 through 7 switches. This will restart test 010 and a not ready condition, if present, will be indicated by the crt display T010NR.

To exit from test 010, set the maintenance panel switches 0 through 7 as desired and toggle the maintenance panel RESET switch.

AUTOLOAD

The terminal must be loaded with an application program in order to perform its required functions. The autoload routine is a ROM resident program that is used to load the applications program into the RAM memory of the terminal. A selection of applications programs is stored in the higher-level processor, and any of these applications programs can be loaded into the terminal through the online communications system. The autoload program in the terminal controls this loading, and also performs the functions of checking the loaded program and jumping to the start of the loaded program. The normal loading sequence is as follows:

1) On power-on or manual reset, the terminal sequences automatically through quicklook tests 001 through 005. Refer to Quicklook Diagnostic paragraphs, this section, for a description of the quicklook tests.
2) If quicklook tests 001 through 005 are performed successfully, the diagnostic jumps to the autoload program.
3) The autoload program requests the load page from the higher-level processor. This page is always loaded into page 1 of terminal memory.

   Note that the applications programs stored in the higher-level processor are divided into pages. The load page contains a page table which describes each program page available from the higher-level processor.
4) First the autoload examines the load page to see if page 2 is also defined as a load page. This will occur if the page table is so long that it cannot be accommodated on page 1, but runs over into page 2.

5) If the page table in page 1 defines page 2 as also being a load page, then the autoload will request this page from the higher-level processor and load it into page 2 of terminal memory.

6) The autoload loads program 1. It does this by scanning the page table and requesting a load of each page which is defined by the page table as being part of program 1. One by one, each page of program 1 is requested from the higher-level processor and loaded into the page of terminal memory specified by the page table.

7) When all the pages of program 1 have been loaded, the autoload jumps to the start of program 1. The start of program 1 is location 000_8 of the starting page of program 1. The starting page of program 1 is the page of program 1 that is listed nearest the start of the page table.

The preceding sequence of events assumes that the terminal is set up for normal operation; such as all the maintenance panel switches (switches 0 through 7 set to logical 0 (left). Once the normal loading sequence has concluded, program 1 will have been loaded into the terminal, and the autoload program will have jumped to the start of program 1. The terminal is now executing program 1.

The execution of program 1 may, at a certain point, specify a change to another program, for example, program 2. This is done by a call to the autoload. The autoload first clears the indicators in the page table which define program 1 as the resident program. The autoload then loads program 2. It does this by scanning the page table and requesting a load of each page which is defined by the page table as being part of program 2. Each page is loaded into the page of terminal memory specified by the page table. When all the pages of program 2 have been loaded, the autoload jumps to the start of program 2. The start of program 2 is location 000_8 of the page of program 2 which appears earliest in the page table.

In a similar manner, any applications program may be written so that at a certain point (probably immediately after a certain test or a certain keyboard input) a change occurs to another applications program. Program 1 is loaded on the initial power up. From then on program 1 may, at a certain point, specify a change to another program and that program may, at a certain point, specify a change to get another program or perhaps a change back to program 1.

In addition to specifying program changes, an applications program may request a program overlay. The bulk of the program remains resident, but an overlay of one or more pages is loaded into the terminal. Such additional pages may overlay or replace resident pages of the program, or may be loaded into pages of terminal memory not previously in use. The page table specifies the pages which comprise the overlay, and specifies where these pages are to be loaded. Overlays are defined by program number and overlay number, and each program may have several overlays.

An overlay is loaded by a call to the autoload. The autoload first scans the page table to find the page numbers of all pages which comprise the overlay. If indicators are set showing any of these pages to be part of the resident program, the indicators are cleared. Then the pages of the overlay are loaded. In the process of loading the overlay, some of the pages of the original program may be overlayed (such as, replaced) by pages of the overlay. When all the pages of the overlay have been loaded, the autoload returns to the point in the applications program that is called the overlay.

The original program to be loaded is defined as overlay 0. Thus, when program 1 is first loaded, it is actually program 1, overlay 0 that is loaded. Actual overlays for a program start with overlay 1, overlay 2, etc.

Once a particular applications program and overlay are resident in the terminal, it is verified by continual checksum tests. The checksum testing routine is contained in the autoload, but must be called by the applications program at periodic intervals. Each time the checksum routine is called, it will checksum another page of resident program. If the page has a checksum error, the autoload will reload the page. However, if the page in error is a load page rather than a program page, then the entire program is in doubt since the checksum for program pages are stored in the load page. Hence, if a load page checksum error is detected, the terminal jumps to the start of the autoload. Program 1, overlay 0 is loaded, replacing whatever program and overlay were resident in the terminal.

AUTOLOAD INDICATIONS

During program loading and checksumming, certain indications are provided to the operator via the microdisplay. This is a small white box which appears in the upper-left corner of the crt.

During the loading of a page, the display L appears, followed by a reference number of the page being loaded. Thus, L000 appears for page reference number 0.

The page reference number is not the same as the page of terminal memory into which the page is being loaded. Rather, it is an artifical number which uniquely identifies each of the program pages stored in the higher-level processor.

If a table describing the program pages stored in the higher-level processor is available, then the page reference number can be found for the following:

- The program and overlay to which the particular page reference number belongs.
- The page of terminal memory into which the page is to be loaded.

If a transmission error occurs in the loading of a page, the autoload will request a reload of the page. If the page is then loaded correctly, the autoload will go to the next task to be performed. If another transmission error occurs, the autoload will request a second reload. After the third unsuccessful reload, an X will be displayed after the page reference number; for example, L005X for three unsuccessful reloads of reference number 5.

Once an X has appeared, the terminal waits for one of the following manual interventions.

- Toggle the EXECUTE switch on maintenance panel. This will cause the autoload to request another reload of the page. As many reloads as desired may be requested in this manner.
- Toggle the RESET switch on maintenance panel, or turn terminal power off, then on again. This will cause the terminal to perform quicklook tests 001 through 005 and then jump to the start of autoload.

After loading a page, the autoload immediately checksums the page, and as previously described, the checksum routine in the autoload may be called on a periodic basis by the applications program. If the checksum routine detects an error, the autoload will determine if the page is a load page. If so, a jump will be made to the start of the autoload program. This will be indicated by the display L000 on the crt (reference number 000, the load page, is always the first reference number to be loaded). If the page is not a load page, the autoload will try to reload the page.

As previously described, in loading or reloading a page, a check is made for transmission errors. If three reloads occur with transmission errors, an error display will appear.

However, if the page is reloaded without transmission errors, it is again checksummed. If the checksum test detects an error, the page is again reloaded. If three reloads occur in succession, each followed by a checksum error, then the display C---X will appear on the crt. For example, if the page reference number in question is reference number 5, then the display C005X will appear. The display of C rather than L indicates that a checksum error rather than a transmission error has occurred.

Once an X has appeared, the terminal waits for manual intervention. At this point, the operator or serviceman has the same options of manual intervention as in the case of an L failure — toggling the EXECUTE switch of another reload, or toggling RESET (or turn power off, then on) to return to the start of the quicklook autoload sequence.

The loading of a nonexistent program or overlay may be requested due to a program or hardware fault. In such a case, the autoload will halt with the display P---X, with the display indicating the program and overlay number which was requested. The display will show an octal number; convert this to a binary. The major 4 bits are the program number and the minor 4 bits are the overlay number requested.

LOAD PAGE AND PAGE TABLE

The load page is always reference number, and is always loaded into page 1 of terminal memory.

The load page is composed as follows:

- Locations 000_8 and 001_8 — Version number
- Locations 002_8 and 003_8 — Terminal status word
- Locations 004_8 and 005_8 — Terminal option word
- Location 006_8 — Always 000_8
- Location 007_8 — Page 1 checksum offset. Transmitted from the higher-level processor as 000_8, this location will be used as an offset to make the checksum of page 1 come out correct.
- Locations 010_8 and following: The page table, which contains an entry for each page of terminal program stored in the higher-level processor. Each entry is three bytes long:

  First byte — Program and overlay number. Program number is the major 4 bits and overlay number is the minor 4 bits. Program numbers up to and including 15 and overlay numbers up to and including 15 are permitted, except that program 15, overlay together, which would be all 1's is not permitted. There is no program 0. If the first byte of the page entry is 000_8, this indicates that the page is a load page.

  Second byte — Page number. Page number occupies bits 5 through 0. Page numbers up to and including 37_8 are permitted. Bit 6 of the second byte is always 0. Bit 7 is transmitted from the higher-level processor as 0, and will be used as the entry flag. If this bit is set to 1, it indicates that the page is part of the resident applications program and overlay.

  Third byte — Page checksum. Transmitted from the higher-level processor as 0, this byte will be used to hold the page checksum if the page is loaded into the terminal. The character 377_8 follows the last entry in the page table and indicates the end of the table.

The sequence of entries in the page table agrees with the page reference numbers assigned to program pages. Thus, the first table entry is the entry for reference number 0 (the load page), the second table entry is the entry for reference number 1, and so forth. Since there are 3 bytes per entry, the reference number of an entry can be determined by:

$$\text{Reference Number} = \frac{\text{Entry Address} - \text{Starting Address of Table}}{3}$$

The first locations in the load page are used in the following manner. Version number (locations 0 and 1) is transmitted back to the higher-level processor in every message from the terminal. It is used to assure that the program stored in terminal memory is the most recent. Terminal status word (locations 2 and 3) and terminal option word (locations 4 and 5) provide information on how the terminal is to be employed. This data may be used by the applications program to enable or inhibit certain program functions, or to cause the loading of certain overlays or a change of applications program.

VERSION NUMBER

A given selection of program pages in the higher-level processor is assigned a version number. Anytime that a program page is revised, added, or deleted from this selection, the version number is incremented. The version number is used to ensure that the terminal is always using the latest version of program.

The version number is transmitted to the terminal in locations 0 and 1 of the load page. Thereafter, every terminal message to the higher-level processor will contain a version field consisting of the following two characters:

- The version field code, 023 B.
- The version number, taken from location 1 of page 1. (This is the minor portion of the version number.)

The higher-level processor compares the version number in the terminal message with the current version number. If different, the higher-level processor ignores the terminal message and sends a program load command to the terminal. When the terminal receives the program load command, it stops what it is doing and goes to the start of the autoload. The terminal will request and receive the current version of the load page and will then request and receive the current version of the program 1.

The request for a load of page reference number 0 (the load page) always contains a version number of 0.

PROGRAM LOADING MESSAGES

Page request, page load, and load command messages are described in the following paragraphs.

Page Request Message

The page request message is generated by the autoload program in the terminal to request a page from the higher-level processor as follows:

Character 1 — Terminal signature

Character 2 — Length of message text = 004

Character 3 — Version field code = 023B = $13

Character 4 — Version number

Character 5 — Page request code = 022B = $12

Character 6 — Page reference number

Character 7 — Checksum (straight add of characters 2 through 6)

Character 8 — Finish code = 017B = $0F

Page Load Message

The page load message is sent by the higher-level processor in response to the terminals page request message and includes the requested page. The page load message is only sent when the page requested by the autoload program is existent. Its content is as follows:

Character 1 — Unit select

Character 2 — Unit select

Character 3 — Memory select code = 027B = $17

Character 4 — Open

Character 5 — 16-byte word; number of bytes in a page minus one

Character 6 — Always 255

Character 7 — Reference number

Character 8 — Starting location in page

Character 9 through N — Data bytes

Character N+1 — Checksum (Checksum: Straight add of characters 5 through N)

Character N+2 — Checksum (Checksum: Straight add of characters 5 through N)

Character N+3 — Finish code = 017B = $0F

Character N+4 — Finish code = 017B = $0F

Load Command Message

The load command message is sent by the higher-level processor to command the autoload program to initiate the loading of an entire new program. This is the response the higher-level processor issues when a message from the terminal does not contain the current program version number. The content of the load command message is as follows:

Character 1 — Unit select

Character 2 — Unit select

Character 3 — Program load select code = 025B = $15

Character 4 — Finish code = 017B - $0F

MANUAL INTERVENTION OF DIAGNOSTIC-AUTOLOAD PROGRAM

Manual intervention of the diagnostic-autoload program in the display terminal is enabled through the use of the switches on the maintenance panel. The operations that can be performed by this action are described in the following paragraphs.

BYPASS QUICKLOOK

This operation is selected by setting switch 7 to a logical 1, with switches 0 through 6 remaining in the normal logical 0 position. Then on a power-on master clear or manual reset (maintenance panel RESET switch toggled), the quicklook tests are bypassed and the program jumps directly to the start of autoload.

BYPASS QUICKLOOK AND AUTOLOAD

This operation is selected by setting switches 6 and 7 to a logical 1, with switches 0 through 5 remaining in the normal logical 0 position. Then on a power-on master clear or manual reset, both the quicklook and autoload are bypassed and the program jumps to the start of whatever applications program is resident in the terminal.

SELECT PORTION OF QUICKLOOK

To select specific quicklook tests, switches 0 through 3 are set to correspond with an assigned binary code and switches 4 through 7 are left in the normal logical 0 position. Then with a power-on master clear or manual reset, the program jumps directly to the portion of the quicklook that has been selected. Upon performance of the selected portion of the quicklook, the program halts and waits until manual intervention via the maintenance panel switches exits it from that portion of the quicklook. A listing of the mentioned binary codes is contained in procedure CRT1, Executing Quicklook Diagnostic, section 6.

PROGRAM PAUSE

This operation can be used in conjunction with either a bypass quicklook or bypass quicklook and autoload operation or it can be used during the normal diagnostic-autoload sequence when display terminal initialization is occurring. It is selected by switch 5 being set to a logical 1 which causes the program sequence to halt before jumping to the start of the applications program. The program sequence remains in this pause condition until switch 5 is set back to a logical 0 which then allows a jump to the start of the applications program to occur.

Conversion information for decimal, binary, octal, and hexadecimal numbering system is contained in table D-1.

TABLE D-1. CONVERSION TABLE

DECIMAL (Base = 10)	BINARY (Base = 2)	OCTAL (Base = 8)	HEXADECIMAL (Base = 16)
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F
16	10000	20	10
17	10001	21	11
18	10010	22	12
19	10011	23	13
20	10100	24	14
21	10101	25	15
22	10110	26	16
23	10111	27	17
24	11000	30	18
25	11001	31	19
26	11010	32	1A
27	11011	33	1B
28	11100	34	1C
29	11101	35	1D
30	11110	36	1E
31	11111	37	1F
32	100000	40	20
33	100001	41	21
34	100010	42	22
35	100011	43	23
36	100100	44	24

COMMENT SHEET

MANUAL TITLE CC617-A/B Display Terminal
Hardware Maintenance Manual

PUBLICATION NO. 62953000 REVISION D

FROM: NAME: _____

BUSINESS ADDRESS: _____

COMMENTS:

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